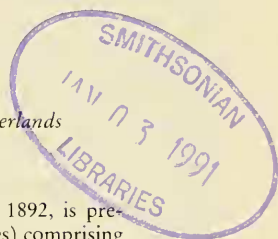


TAXONOMY AND BIOGEOGRAPHY OF ORIENTAL PRASIINI. 2. THE *FOLIATA* GROUP OF THE GENUS *LEMBEJA* DISTANT, 1892 (HOMOPTERA, TIBICINIDAE)

by

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ABSTRACT

A tentative concept for the *foliata* group of the genus *Lembeja* Distant, 1892, is presented. This group consists of two subgroups: the *foliata* subgroup (11 species) comprising *L. foliata* (Walker, 1858), *L. dekkeri* n.sp., *L. elongata* n.sp., *L. hollowayi* n.sp., *L. incisa* n.sp., *L. majuscula* n.sp., *L. minahassae* n.sp., *L. mirandae* n.sp., *L. oligorhanta* n.sp., *L. pectinulata* n.sp., all from Sulawesi, and *L. sangihensis* n.sp. from Sangihe island, about 200 km north of Manado (Sulawesi Utara), and the *distanti* subgroup (2 species) comprising *L. brendelli* n.sp. and *L. distanti* n.sp., both from Sulawesi. Some comments on characters and various character states, in connection with the supposed monophyletic status of the species-group, are given. All species are (re)described and structures of taxonomic importance as well as the whole insects are depicted. A key to all males and some females is presented.

INTRODUCTION

The present study of the genus *Lembeja* Distant, 1892, is a further contribution to a revision of the Oriental Prasiini, started by De Jong and Duffels (1981) and continued by De Jong (1982, 1985).

Within the Oriental Prasiini, *Lembeja* is the most diversified and by far the most widespread genus. It is distributed over the Philippines (Mindanao), Sangihe island, Sulawesi, Lesser Sunda islands, New Guinea, Torres Strait islands and northern Queensland. The genus is tentatively divided in several species-groups by the present author on the basis of what are considered synapomorphic characters. These groups will be defined in this and forthcoming publications. Consequences for the taxonomy of the Oriental Prasiini as a whole will be discussed in a final paper, dealing with phylogenetic relationships of the *Lembeja* species-groups and the other taxa of the tribe.

One species-group and an assemblage of species have already been mentioned, though superficially, in previous publications, viz. the *fatiloqua* group (see De Jong, 1985) and an assemblage of species similar to *Lembeja robusta* Distant, 1909 (see De Jong & Duffels, 1981; De Jong, 1982).

The group dealt with here, the *foliata* group, is distributed over Sulawesi and Sangihe island, 200 km north of Manado (Sulawesi Utara).

HISTORY OF THE GENUS

Lembeja (originally described as *Perissoneura* Distant, 1883 (nom. preocc.)), was erected for *Lembeja maculosa* (Distant, 1883). Other species originally described in *Lembeja* or *Perissoneura* and not yet synonymized are *L. paradoxa* (Karsch, 1890) (see for synonymies De Jong, 1982), *L. fruhstorferi* Distant, 1897, *L. papuensis* Distant, 1897 (see for synonymies De Jong & Duffels, 1981), *L. sanguinolenta* Distant, 1909, *L. robusta* Distant, 1909, *L. roebli* Schmidt, 1925, and *L. harderi* Schmidt, 1925. The first species transferred to *Lembeja* is *Cephaloxys foliata* Walker, 1858 (see Distant, 1905). Stål had already referred this species to *Prasia* Stål, 1863 in 1862, thus erecting *Prasia* by indication (International Code of Zoological Nomenclature, 1985: Chapter iv, Article 12b 5). However, as it is common usage to regard *Prasia faticina* Stål, 1863, as the type-species of *Prasia*, the accepted concepts of *Prasia* and *Lembeja* would be at stake when the Rules would be followed strictly (see also De Jong, 1985). Other attributions are *Prasia fatiloqua* Stål, 1870 (see Horvath, 1913; Myers, 1928, 1929), *P. vitticollis* Ashton, 1912 (see De Jong, 1982) and *P. tincta* Distant, 1909 (see De Jong, 1985).

Since attributions of species to *Lembeja* or *Prasia* were often based upon obscure reasons, an attempt has been made recently (De Jong, 1985) to define characters that separate *Prasia*

from *Lembeja*, in addition to those presented with a new concept for *Prasia*.

INFRAGENERIC RELATIONSHIPS

In spite of the heterogeneity of *Lembeja* in its present concept, some distinctly separable species-groups can be recognized. One group has been mentioned above: the *fatiloqua* group. Furthermore, an assemblage of species similar to *L. robusta* has been recognized.

The *fatiloqua* group is characterized by a median longitudinal dentation of the male tergite 1, and the capability of males to inflate their bodies to a great extent, so that the large intersegmental membranes become visible. This feature is also displayed by the African genus *Iruana* Distant, 1905 (Boulard, 1976, 1981). Species attributed to the *fatiloqua* group are *L. fatiloqua*, *L. fruhstorferi*, *L. maculosa*, *L. paradoxa*, *L. roebli*, *L. sanguinolenta* and *L. tincta*.

The species similar to *L. robusta*, share a more or less strongly developed trilobate structure of the uncus in ventral view. Species attributed to this assemblage are, apart from some undescribed ones, *L. papuensis*, *L. robusta* and *L. vitticollis*.

A third group, the monophyletic *foliata* group, is defined here.

The *foliata* group

The *foliata* group is a monophyletic group, defined here by one presumed synapomorphy: the median longitudinal ridge on the male tergite 1 (fig. 32).

Tentatively, two subgroups are recognized, the *foliata* subgroup, comprising *L. dekkeri* n.sp., *L. elongata* n.sp., *L. foliata* (Walker, 1858), *L. hollowayi* n.sp., *L. incisa* n.sp., *L. majuscula* n.sp., *L. minabassae* n.sp., *L. mirandae* n.sp., *L. oligorhanta* n.sp., *L. pectinulata* n.sp. and *L. sangihensis* n.sp., and the *distanti* subgroup, with *L. brendelli* n.sp. and *L. distanti* n.sp. These two groups can be separated on account of different states of characters mainly found in the dorsal aedeagal appendage, the lateral part of the pygofer, the 3rd and 4th antennal segment and the ovipositor sheath. These differences are exemplified below.

The *foliata* subgroup is recorded from Sangihe island and North and Central Sulawesi, the *distanti* subgroup from Central and South-east Sulawesi. Neither of these subgroups have been found in South-west Sulawesi.

Some characters of the *foliata* group were studied in detail to investigate their significance for the reconstruction of a phylogeny of this species-group and of the Prasiini as a whole. These characters will be discussed here pending their eventual application in the classification of the Prasiini.

Base of dorsal aedeagal appendage. — In almost all species, the base of the dorsal aedeagal appendage is very broad and sturdy and nearly always sclerotized. In other genera and species-groups of the Oriental Prasiini the base is more narrow and usually not sclerotized.

Apex of dorsal aedeagal appendage. — The dorsal aedeagal appendage either bears two apical hook-shaped processes (*distanti* subgroup), or broadens towards the apex, which may be more or less incised (*foliata* subgroup). The appendage is absent in *L. pectinulata* n.sp. When present in other species of oriental Prasiini, the appendage is usually weakly sclerotized, and splits into two slender to broad processes of variable length.

Antennal combs. — Combs of hairs on the 3rd antennal segment (and usually onwards on the 4th segment) are hardly developed in the *distanti* subgroup and very distinct in almost all species of the *foliata* subgroup. The *foliata* group is the only one known within the Cicadoidea that displays this character.

Lateral pygofer lobe. — A flat enlargement of the lateral part of the pygofer in the *foliata* subgroup is situated between each of the edges running from the caudal dorsal beak to the lateral lobes, and a ridge-like structure running from the base of the lateral pygofer-lobe in posterior direction. This ridge is also more or less present in some species of the *fatiloqua* group, where they do not form a flat enlargement as in the *foliata* subgroup. The species of the *distanti* subgroup have thick lateral lobes.

Spotting of tegmina. — This is usually red in the cells of the tegmina in the *foliata* subgroup, more brownish in the *distanti* subgroup. Pigmentation of the tegmina in other species of the Oriental Prasiini is still under study.

Mesostigma. — Large within the *foliata* group. Outside the *foliata* group this character is also found in *L. papuensis* and in two undescribed species from New Guinea.

Ovipositor sheath. — Long (sometimes very long) in the *foliata* subgroup and relatively short in the *distanti* subgroup, as in almost all

species of the Oriental Prasiini. A long ovipositor sheath is also found in *Jacatra typica* Distant, 1905, and, to an even greater extent, in an undescribed species of this genus from Jawa and Sumatera.

DEPOSITORIES

The abbreviations given below are used in the lists of material and throughout the text.

BIN	Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussel.
BMNH	British Museum (Natural History), London.
CNMW	Collection Naturhistorisches Museum, Wien.
DEI	Deutsches Entomologisches Institut, Eberswalde.
MHNG	Muséum d'Histoire Naturelle, Genève.
MSNG	Museo Civico di Storia Naturale "G. Doria", Genova.
MZB	Museum Zoologicum Bogoriense, Bogor.
RMNH	Rijksmuseum van Natuurlijke Historie, Leiden.
SMD	Staatliches Museum für Tierkunde, Dresden.
ZMA	Instituut voor Taxonomische Zoölogie, Zoölogisch Museum, Amsterdam.

ACKNOWLEDGEMENTS

I am very obliged to Dr J. P. Duffels, Dr P. Oosterbroek and Prof. Dr J. H. Stock for their critical reading of the manuscript.

The material studied was gratefully received from Mr R. Detry (BIN); Dr W. J. Knight, Mr M. D. Webb and Mr P. S. Broomfield (BMNH); Dr A. Kaltenbach c.s. (CNMW); Prof. Dr H. J. Müller, Dr G. Petersen and Dr A. Täger (DEI); Dr B. Hauser (MHNG); Dr R. Poggi (MSNG); Dr S. Adisoemarto (MZB); Dr P. H. van Doesburg (RMNH); Dr R. Emmrich (SMD). Most valuable material was gratefully received from the "Project Wallace" expedition and some of its participants, among which Dr H. S. Barlow, Mr M. J. D. Brendell, Dr J. P. Duffels, Dr T. W. Harman, Dr J. D. Holloway, Dr B. Pitkin, Dr G. Robinson, Dr J. van Stalle and Dr M. R. Wilson. This paper is based in part on material collected whilst the author was a participant on Project Wallace, sponsored by the Royal Entomological Society of London and the Indonesian Institute of Sciences (Results of Project Wallace No. 19).

I am indebted to Mr G. Verlaan and Mr J.

Zaagman for technical assistance, to Mr L. v. d. Laan for the photographs and to Dr W. N. Ellis for help with nomenclatorial problems.

The participation of Dr J. P. Duffels to the "Project Wallace" expedition was supported by the Netherlands Foundation for the Advancement of Tropical Research (WOTRO: WR85—197).

The present investigations were supported by the Foundation for Fundamental Biological Research (BION), which is subsidized by the Netherlands Organization for the Advancement of Pure Research (ZWO).

Part of the material from the Rijksmuseum van Natuurlijke Historie at Leiden (RMNH) mentioned in this publication will be deposited eventually in the Museum Zoologicum Bogoriense at Bogor (MZB).

TAXONOMY

A short characterization of the species-group as a whole is presented here, whilst some details of each subgroup will precede the descriptions of the species, included in the subgroup.

All methods of investigation follow De Jong (1985), with the exception of the measurements taken of the abdomen length (and consequently the body length) and the ovipositor sheath length of the females, which is exemplified in fig. 4.

The female genitalia have not been studied yet, since I intend to publish separately a paper dealing with the female genital characters of the Oriental Prasiini.

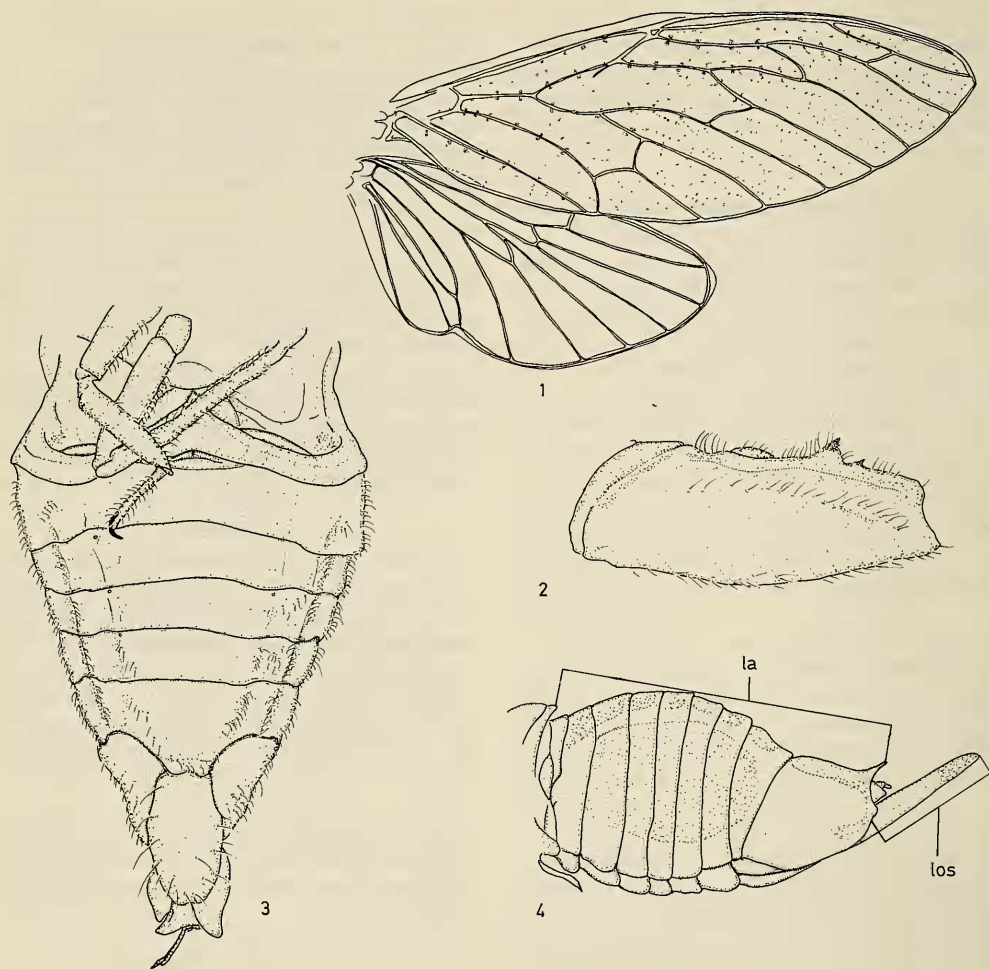
The *Lembeja foliata* group

Head triangularly protruding in dorsal view. Antennal segment 1 clearly visible; segment 3 and 4 mostly provided with comb(s) of hairs.

Mesostigma large. Male opercula small, just extending over tymbal cavities.

Tegmina hirsute, always with small spots combined to somewhat larger patches along the veins in a regular pattern, and with small spots inside the tegmen areas. Third apical area 0.78—1.05 × as long as 4th apical area. Cu_2 and A_1 veins fused up to the tegmen border. Wing with anal field enclosed by a fusion of the Cu_2 and A_1 veins between 69—95% of their length.

Male abdomen carinate along tergites 3—7. Laterally tergites 3—8 strongly folded, forming a lateral ridge on each side of the sternites. Tergite 1 bulbous with two short lateroproximal flaps, each continued into a weakly sclerotized flap; medially a longitudinal ridge present, end-



Figs. 1—4. Semischematic figures of the *L. foliata* group: 1, right tegmen and wing, *Lembeja elongata*; 2, female femur, lateral view, *L. elongata*; 3, male abdomen, ventral view, *L. elongata*; 4, female abdomen, lateral view, *L. majuscula* (la= length abdomen; los= length ovipositor sheath).

ing in a more or less triangular shaped bulb, often attached to tergite 2. Triangularly shaped sternite 1 small, blunt at apex. Folded membranes and mirrors medium-sized. Sternite 8 usually short; broad at base.

Tymbals with 14—23 long ridges, alternating with usually the same number of short ridges.

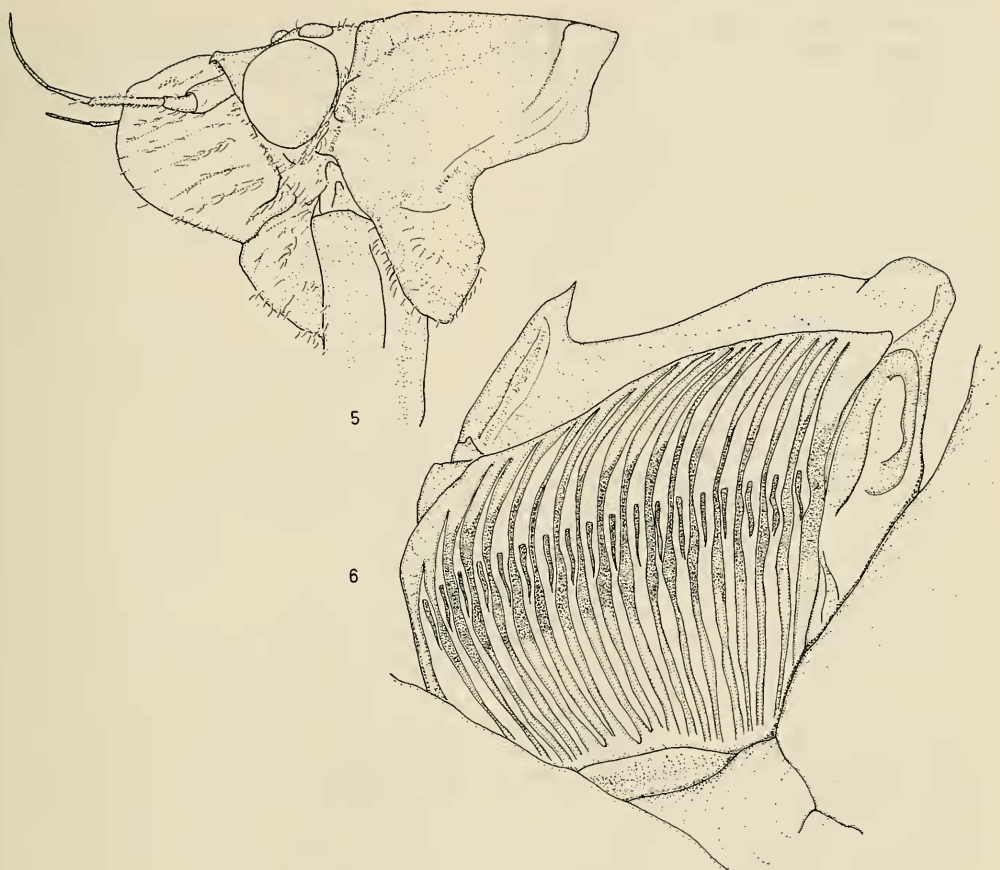
Female abdomen slender, carinate dorsally; in lateral view convex along tergites 3—8. Ovipositor sheath extending beyond caudal dorsal beak.

Lateral lobes of the pygofer fairly long, but mostly not extending beyond anal valves. Caudal dorsal beak broad and long. Claspers broad at base, tapering towards apex, which often has

a small apical protrusion. Median uncus part more or less pointed. Aedeagus fairly stout, dentate apex usually rounded. All species (except *L. pectinulata* n.sp.) provided with a more or less broadly attached dorsal aedeagal appendage.

Key to the species of the *foliata* group
(species marked with an asterisk are keyed out for the males only)

1. Antennal segment 3 with distinct comb (sometimes also on segment 4) (fig. 23). ♂: tergite 1 distally not, or slightly, depressed on both sides of the triangular shaped bulb (fig. 22); dorsal aedeagal appendage, when



Figs. 5, 6. *L. foliata* group: 5, head and pronotum, lateral view, *Lembeja minabassae*; 6, left tymbal, lateral view, *L. mirandae*.

present, unpaired, broad with sometimes slightly incised apex (fig. 9). ♀: ovipositor sheath relatively long (fig. 4)

- *foliata* subgroup 2
- Antennal segment 3 without or with weakly developed comb. ♂: tergite 1 distally clearly depressed on both sides of the triangular bulb (fig. 127); dorsal aedeagal appendage with two hook-shaped processes (fig. 120). ♀: ovipositor sheath, though extending beyond caudal dorsal beak, relatively short *distanti* subgroup 12
- 2. Tegmina more or less opaque, usually green 3
- Tegmina (sub)hyaline, sometimes greenish or with large spots 6
- 3. Tymbal with 19—22 long ridges 4
- Tymbal with 14 long ridges, alternating

with an equal number of short ridges. North Sulawesi *foliata* (p. 149)*

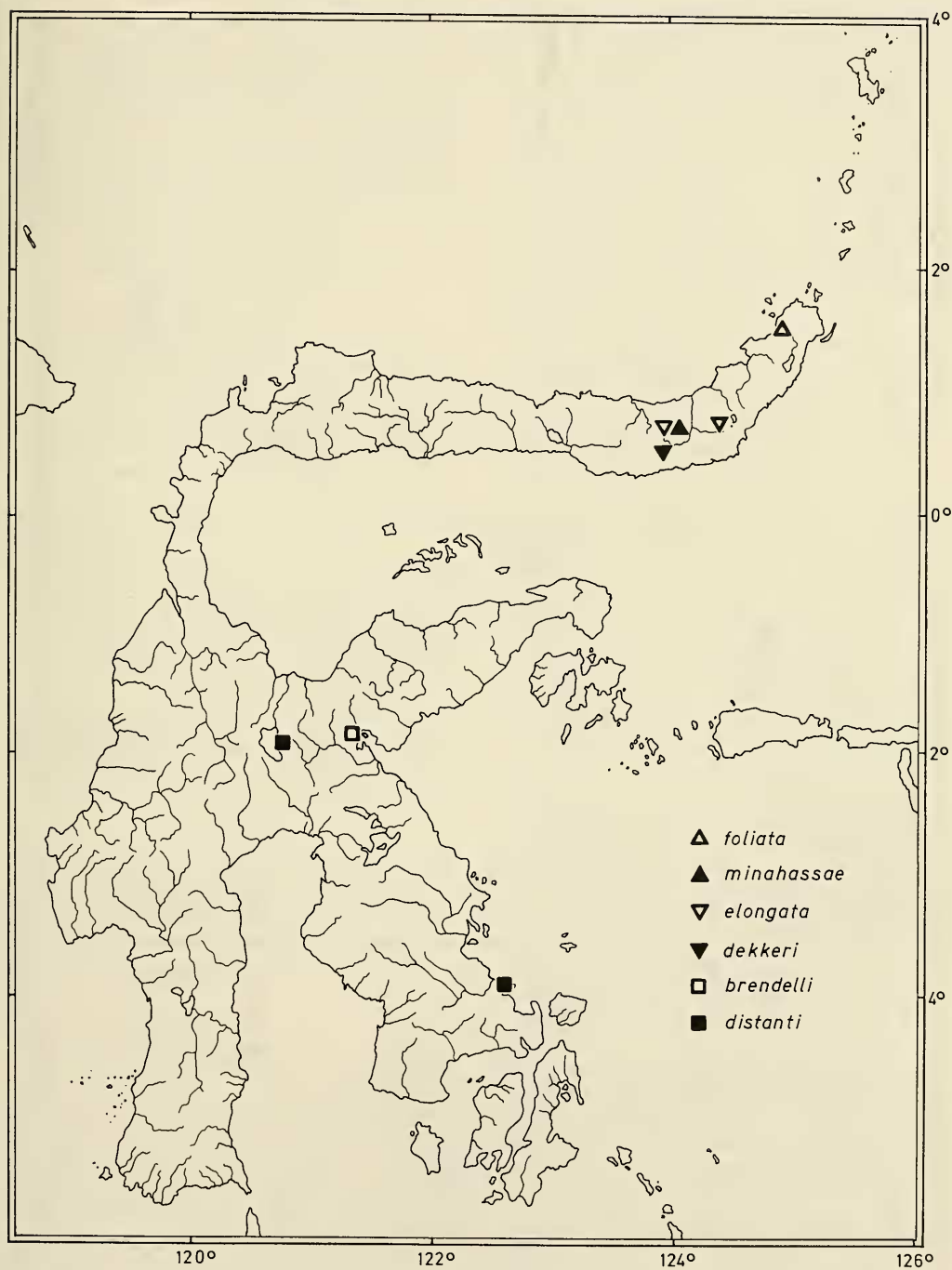
- 4. Medium-sized species (body length ♂: 18.3—22.7 mm, ♀: 19.1—22.4 mm). ♂: tymbal with 19—22 long ridges; base of weakly sclerotized dorsal aedeagal appendage relatively narrow, apex of appendage round or only slightly incised; apex of aedeagus with a more or less dorsal projection. ♀: abdomen rather sturdy; tegmina weakly opaque. Altitude ≥ 1000 m. North Sulawesi 5
- Relatively small species (body length ♂: 14.8—17.5 mm, ♀: 19.1—20.8 mm). ♂: tymbal with 21 long ridges; dorsal aedeagal appendage weakly to fairly sclerotized and with a relatively sturdy base, apex medially incised; apex of aedeagus ovally shaped. ♀:

- abdomen rather slender; tegmina fairly opaque. Altitude ≤ 800 m. North Sulawesi *minahassae* (p. 151)
5. Body length: 18.3—21.7 mm. Apex of aedeagus with a long dorsal projection. Altitude 1000—1200 m. North Sulawesi *elongata* (p. 153)*
- Body length: 21.1—22.7 mm. Apex of aedeagus without or with a short dorsal projection. Altitude ca. 1600 m. North Sulawesi *dekkeri* (p. 155)*
6. Tegmina (sub)hyaline (may be greenish tinged) with small red spots along the veins and inside the cells of the tegmen 7
- Tegmina hyaline with medium-sized to large brown or dark-red spots inside the cells of the tegmen 10
7. Dorsal aedeagal appendage absent; aedeagus with large tooter-shaped apex. North Sulawesi *pectinulata* (p. 158)*
- Dorsal aedeagal appendage present; apex of aedeagus different 8
8. Body brownish coloured. Aedeagus broadened laterally at apex (fig. 58); clasper broad in lateral view. Sangihe island *sangihensis* (p. 160)*
- Body green to greenish-yellowish, sometimes with a brown patch on the cruciform elevation. Aedeagus not broadened laterally; clasper apically swollen in lateral view. North and Central Sulawesi 9
9. Red spots inside cells and along veins on the whole of the tegmina. Small species (body length δ : 13.4—15.5 mm, η : 14.6—16.8 mm). δ : apex of dorsal aedeagal appendage as in fig. 67. North and Central Sulawesi *hollowayi* (p. 162)
- Red spots only conspicuous along veins in basal part of tegmen, sometimes also slightly in apical part. Medium-sized species (body length δ : 18.4 mm, η : 18.4—19.1 mm). δ : apex of dorsal aedeagal appendage as in fig. 80. Central Sulawesi *oligorhanta* (p. 164)
10. Small, heavily pigmented species with hardly any spots inside the cells of the tegmen. Body size δ : 14.2—15 mm, η : 15.1—16.7 mm. Central Sulawesi *incisa* (p. 171)
- Large, heavily pigmented species with more or less brown spotted cells of the tegmen. Body size δ : 22.8—25.5 mm, η : 20.4—21.6 mm. Central Sulawesi 11
11. Tegmina heavily spotted with brown in the cells of the tegmen. δ : median black spots on the carinated tergites 3—7; dark coloration onwards to the caudal dorsal beak; apex of aedeagal appendage as in fig. 98. η : caudal dorsal beak dark coloured. Central Sulawesi *majuscula* (p. 170)
- Tegmina less heavily spotted with brown in the cells of the tegmen. δ : black spots on the carinated tergites 3—7 absent; apex of aedeagal appendage as in fig. 91. η : medio-dorsal black coloration on segment 9 not reaching the caudal dorsal beak. Central Sulawesi *mirandae* (p. 166)
12. Antennal comb on segment 3 may be present. Distance between lateral ocelli 0.83—0.97 $\times$ distance lateral ocellus and eye. δ : pygofer without distinct ridge from the base of each lateral lobe downwards. Central and South-East Sulawesi ... *distanti* (p. 175)
- Antennal comb on segment 3 when present, only very slightly. Distance between lateral ocelli 1.0—1.6 $\times$ distance lateral ocellus and eye. δ : distinct ridge on the pygofer from base of each lateral lobe downwards. Central Sulawesi *brendelli* (p. 178)

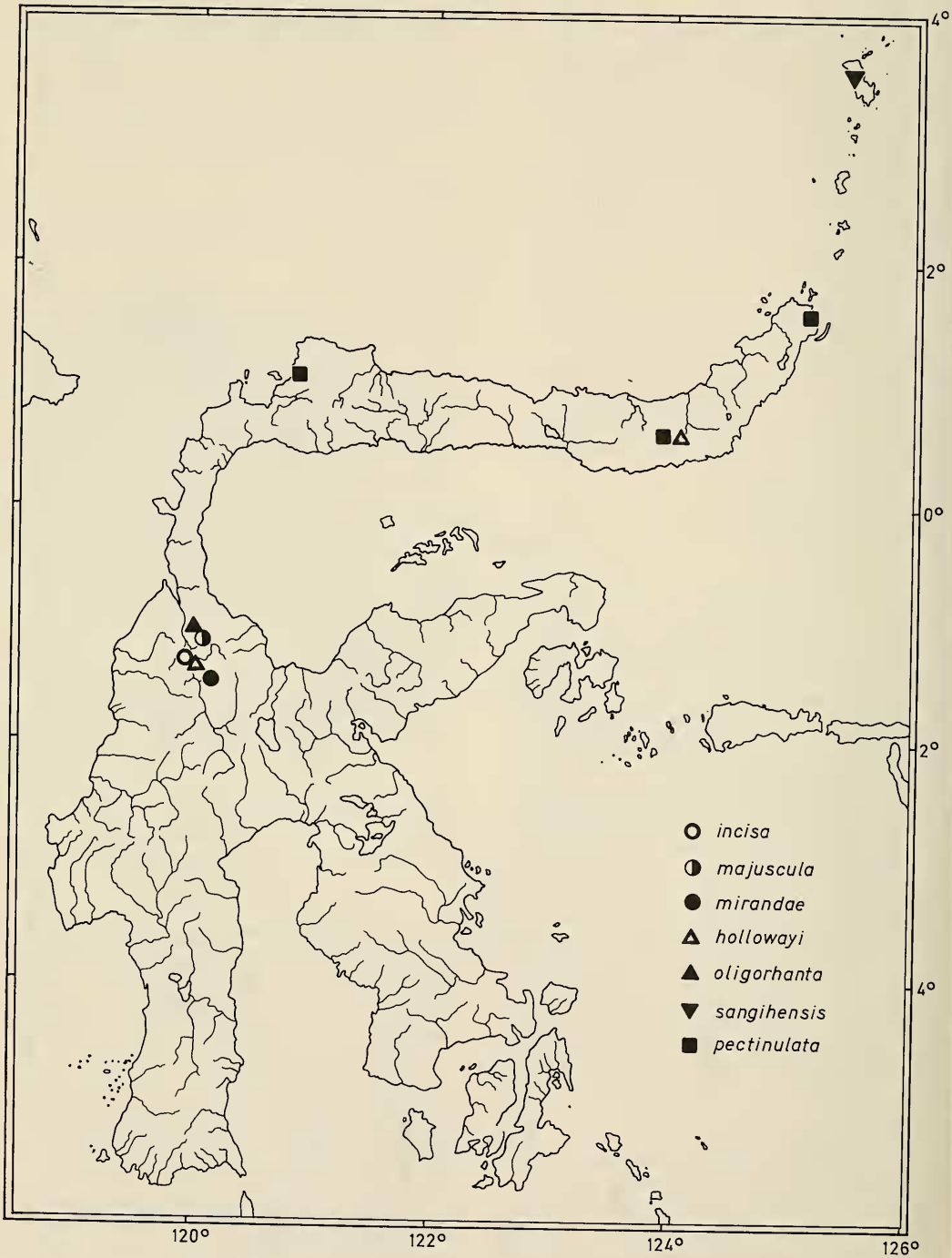
The material studied contains several unidentified females of the *foliata* group that probably represent undescribed species, of which no males have been found. Three large females (body length: 23.5—24.5 mm) from Sangihe island (BMNH; RMNH) and four smaller females (body length: 16.5—17.4 mm) from Morowali (Sulawesi Tengah) (BMNH) represent two species of the *foliata* subgroup with opaque tegmina. Three small females (body length: 15.2—17.3 mm) from Morowali (BMNH) represent one species with (sub)hyaline tegmina of the same subgroup. One female (body length: 20.2 mm) from Mt. Tambusisi (Morowali N.P.) (BMNH) represents a species that has brown and/or dark-red spots in the cells of the tegmina, and still belonging to the same subgroup. Finally, one female (body length: 24.7 mm) from Mt. Tambusisi (Morowali N.P.) (BMNH) represents a species belonging to the *distanti* subgroup.

The *foliata* subgroup

The *foliata* subgroup is characterized by the presence of distinct combs on the 3rd, and sometimes 4th, antennal segment. Eyes small, width 0.43—0.67 $\times$ as wide as width of vertex between eyes. Tegmina opaque or (sub)hyaline. Spots on the tegmina always red, deep-red to brown in *L. majuscula* n.sp., *L. mirandae* n.sp. and *L. incisa* n.sp. Aedeagal appendage (lacking in *L. pectinulata* n.sp.) usually sclerotized and



Map 1. Distributions of *L. brendelli*, *L. dekkeri*, *L. distante*, *L. elongata*, *L. foliata* and *L. minahassae*.



Map 2. Distributions of *L. hollowayi*, *L. incisa*, *L. majuscula*, *L. mirandae*, *L. oligorhanta*, *L. pectinulata* and *L. sangihensis*.

slightly incised at its broad apex. Lateral part of pygofer provided with a flat enlargement between the edge of the caudal dorsal beak, running to each lateral lobe, and the ridge running backwards from the base of each lateral lobe. Lateral lobe somewhat recurved at its apex (fig. 20). Median uncus part with a smooth, pointed projection. Ovipositor sheath extending relatively far beyond caudal dorsal beak.

***Lembeja foliata* (Walker, 1858)**
(figs. 7—14, map 1)

Cephaloxys foliata Walker, 1858: 37.

Prasia foliata; Stål, 1862: 483; Distant, 1892: xiv (in partim: specimens from Sulawesi (= Celebes) only): 146: pl. 15 figs. 12, 12a—b (equals *Cephaloxys foliata* Walk.); Breddin, 1901: 28.

Lembeja foliata; Distant, 1906: 185 (equals *Prasia foliata* equals *Cephaloxys foliata*); Kato, 1932: 189; Metcalf, 1963: 430, 431; De Jong, 1985: 165, 166.

The following references were found to relate to other species:

Prasia foliata; Distant, 1892: xiv (in partim: specimens from Sangihe island belong to *Lembeja sangihensis* n.sp.); Breddin, 1901: 153 (specimens from Sangihe belong to *Lembeja sangihensis* n.sp.); Lallemand, 1935: 677 (Flores specimens belong to a yet undescribed species related to *L. harderi*).

Lembeja foliata; Lallemand and Synave, 1953: 233 (Flores specimens belong to a yet undescribed species related to *L. harderi*; Sumba specimens belong to *L. harderi* and to a yet undescribed relative to this species).

My knowledge of the species is based on two specimens only, viz. the male holotype, whose genitalia are damaged, and a male from an unknown locality in bad condition, but its genitalia fairly intact (only the apex of the caudal dorsal beak missing).

Description of the male.

Body testaceous. Head and pronotum together 1.14—1.34 × as long as meso- and metanotum together. Thorax and head together 1.09 × as long as abdomen. Greatest width of body at the height of abdominal segment 3.

Head.—Postclypeus strongly protruding in dorsal view. Antennal combs on 3rd and 4th segments. Eye small, in dorsal view 0.43—0.49 × as wide as width of vertex in between eyes. Ocelli raised. Distance between lateral ocelli 0.9—1.2 × as long as distance between lateral ocellus and eye. Head 1.54—1.82 × as long, 1.85—1.98 × as wide as width of vertex in be-

tween eyes. Postclypeus in ventral view strongly laterally compressed, in lateral view transverse ridges distinct, concolorous. Rostrum with dark apex reaching trochanter of middle leg.

Thorax.—Pronotum collar 1.61 × as wide as head including eyes, 1.75 × as wide as length of head. Pronotum weakly domed. Mesonotum dark on its lateral parts and in front of cruciform elevation, thus indicating four obconical areas. Length of cruciform elevation about 1/3 of mesonotum length. Metanotum projecting distinctly from under mesonotum.

Legs.—Concolorous, fore femora bearing three spines. Basal one very long and pointed apically; middle spine triangularly shaped, about half as long as basal one; most apical spine very small. Fore tibiae with a brown patch apically.

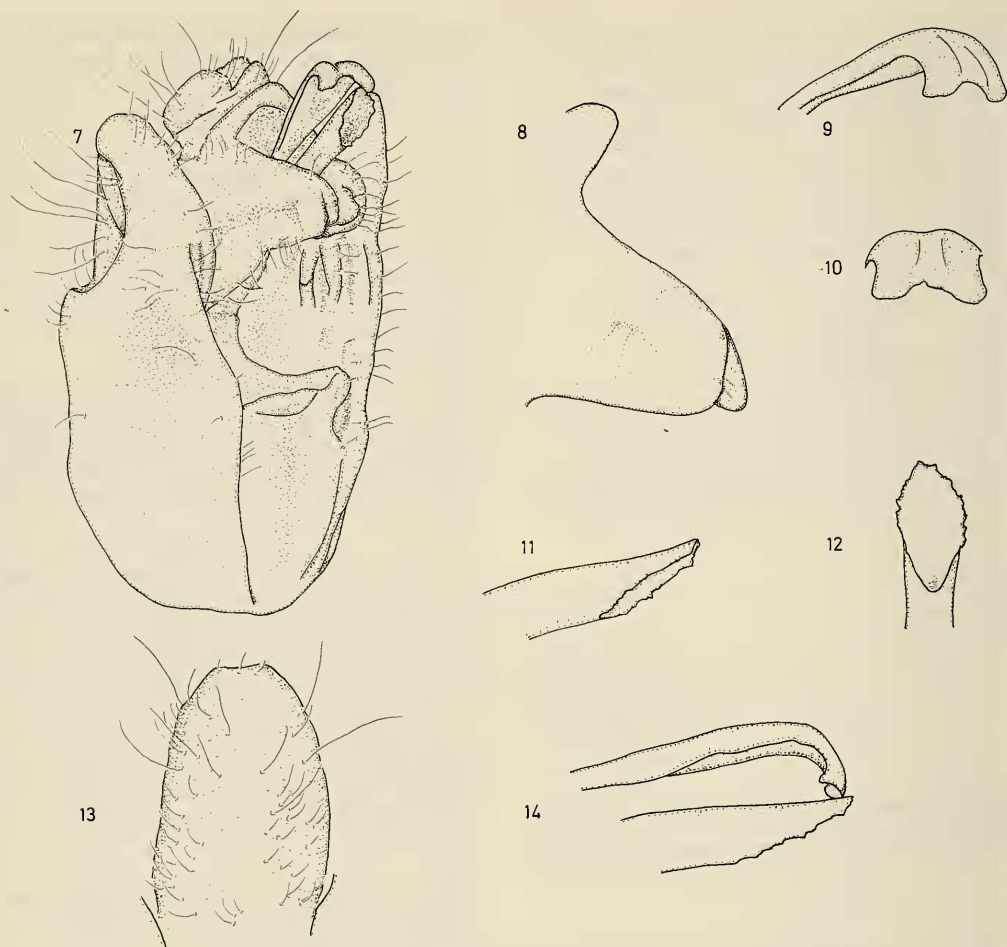
Tegmina and wings.—Costa of tegmen very finely hirsute. Subhyaline, testaceous. Spotted with red along veins in a very regular pattern, small red punctations inside tegmen cells. Transverse vein of 2nd ulnar area extending into 3rd one; continued by a fold, up to the fusion of the Cu_{1b} and the transverse vein of the 8th apical area. Node in M_{3+4} at about 3/5 of its length. Third ulnar area 1.09 × as long as 1st ulnar area; 4th ulnar area 0.97 × as long as radial area. Wings pale hyaline. Veins milky white coloured. A_1 and Cu_2 fused at 75% of their own length.

Operculum.—Distal part of operculum very small. Meracanthus large, reaching more than halfway over tymbal cavity.

Abdomen.—Broadly shaped. Medial ridge on tergite 1 ending in a triangularly shaped bulb, broadly attached to tergite 2. Folded membrane dark coloured.

Tymbals.—Relatively large, 14 long ridges alternating with an equal number of short ridges.

Genitalia.—Pygofer with a medium-sized, apically rounded, broad caudal dorsal beak. Lateral lobes long, but not extending beyond anal valves, somewhat concave at outside, convex at inside. Edge running downwards from lateral lobe to base of pygofer slightly rounded. Median part of uncus small, weakly pointed. In lateral view claspers broad, apically tapering, with a small nail-shaped protrusion; median part narrow in dorsal view. Aedeagus with apex as in fig. 11, dentate. Flat dorsal aedeagal appendage medio-apically weakly sclerotized, broadening towards its apex, consisting of



Figs. 7—14. *Lembeja foliata*, unknown locality. 7, pygofer, ventrolateral view; 8, clasper, lateral view; 9, aedeagal appendage ventrolateral view; 10, apex of aedeagal appendage, ventral view; 11, 12, apex of aedeagus, 11, ventrolateral view, 12, ventral view; 13, sternite 8, ventral view; 14, apex of aedeagus with appendage, lateral view.

a medial incision and reaching apex of aedeagus.

Measurements of the material studied: body length 17.8 mm; width of pronotum collar 5.7 mm; tegmen length 22.1—23.2 mm.

Distribution. — North Sulawesi: Manado (map 1).

Material examined. — Indonesia, Sulawesi: Manado “Celebes” (with on leaf-over) “^{55/22}” (round label, handwritten; according to the acquisition books of the BMNH “^{55/22}” stands for Manado), “*Prasia*” (handwritten), “*Cephaloxys foliata*” (with on leaf-over) “gineis, tibiis tarsisque/areolis margin alibus fus” (print), “Type” (round label, green edged, print), “Brit. Mus”

(print), ♂ holotype of *Cephaloxys foliata* (BMNH). Specimen without locality: 1 ♂ (RMNH).

Remarks.

L. foliata closely resembles *L. minahassae* n.sp., *L. elongata* n.sp. and *L. dekkeri* n.sp. in the opaque tegmina and the clasper which is fairly broad in lateral view. Some females in the material studied may be attributed to *L. foliata*, but the identification is uncertain so that they remain unidentified. As far as known the species was not collected during the “Project Wallace” Expedition in the Dumoga-Bone N.P. (Sulawesi Utara). It is distinct for its relatively low num-

ber of alternating pairs of ridges on the tymbal and its apex of the dorsal aedeagal appendage.

***Lembeja minahassae* n.sp.**
(figs. 15—25, 139, 140, map 1)

The description of this new species is based upon specimens collected during the "Project Wallace" Expedition in the Dumoga-Bone N.P. (Sulawesi Utara), primarily by Dr J. P. Duffels (ZMA) and Dr J. D. Holloway (Commonwealth Institute of Entomology). The species is described in comparison with *L. foliata*.

Description.

Coloration of most males studied suggesting immaturity. Smaller than *L. foliata*, yellowish green coloured. Head and pronotum $0.98\text{--}1.2 \times$ as long as meso- and metanotum together. Thorax and head together in males $0.72\text{--}0.88 \times$, in females $0.83\text{--}0.89 \times$ as long as abdomen. Greatest width of body at the height of abdominal segment 3.

Head. — Yellowish green. Antennal combs as in *L. foliata*. Eye small to medium-sized in dorsal view, $0.46\text{--}0.6 \times$ as wide as width of vertex in between eyes. Ocelli raised. Distance between lateral ocelli in males $0.82\text{--}1.0 \times$, in females $1.08\text{--}1.28 \times$ distance between lateral ocellus and eye. Head $1.53\text{--}1.74 \times$ as long, $1.92\text{--}2.2 \times$ as wide as vertex width between eyes. Postclypeus ventrally green. Rostrum as in *L. foliata*.

Thorax. — Pronotum collar $1.55\text{--}1.97 \times$ as wide as width of head, $1.94\text{--}2.29 \times$ as wide as length of head. Four, green to yellow, obconical areas indicated by patches; median obconical areas being less than half as long as paramedian ones, the latter reaching cruciform elevation. Hind edge of cruciform elevation somewhat darker coloured. Metanotum as in *L. foliata*.

Legs. — Spines on fore femora as in *L. foliata*. Fore femora darker green than remaining part of legs. All legs darkening towards claws.

Tegmina and wings. — Tegmina opaque green (more conspicuous in females), extreme base milky white. Costa somewhat amplified. Spotting similar to *L. foliata*. Veins yellowish green to green. Third ulnar area $0.93\text{--}1.16 \times$ as long as 1st one; 4th ulnar area $0.85\text{--}1.0 \times$ as long as radial area. Transverse vein and corial fold as in *L. foliata*. Wings milky, fusion of Cu_2 and A_1 at $72\text{--}83\%$ of their length.

Male: Operculum. — Small. Meracanthus broad at base, long and pointed, extending well over tymbal cavity.

Abdomen. — Yellowish green coloured. Generally as in *L. foliata*, but distally more slender. Folded membrane white.

Tymbals. — Twenty-one long ridges alternating with an equal number of short, slightly brownish coloured ridges.

Genitalia. — Generally as in *L. foliata*. Lateral lobes rather swollen. Median part of uncus slender and somewhat more pointed. Edge of pygofer just below each lateral lobe more outcurved than in *L. foliata*. Weakly sclerotized apex of dorsal aedeagal appendage incised; just reaching apex of aedeagus.

Female: Operculum. — Small and rounded. Meracanthus reaching just over sternite 3.

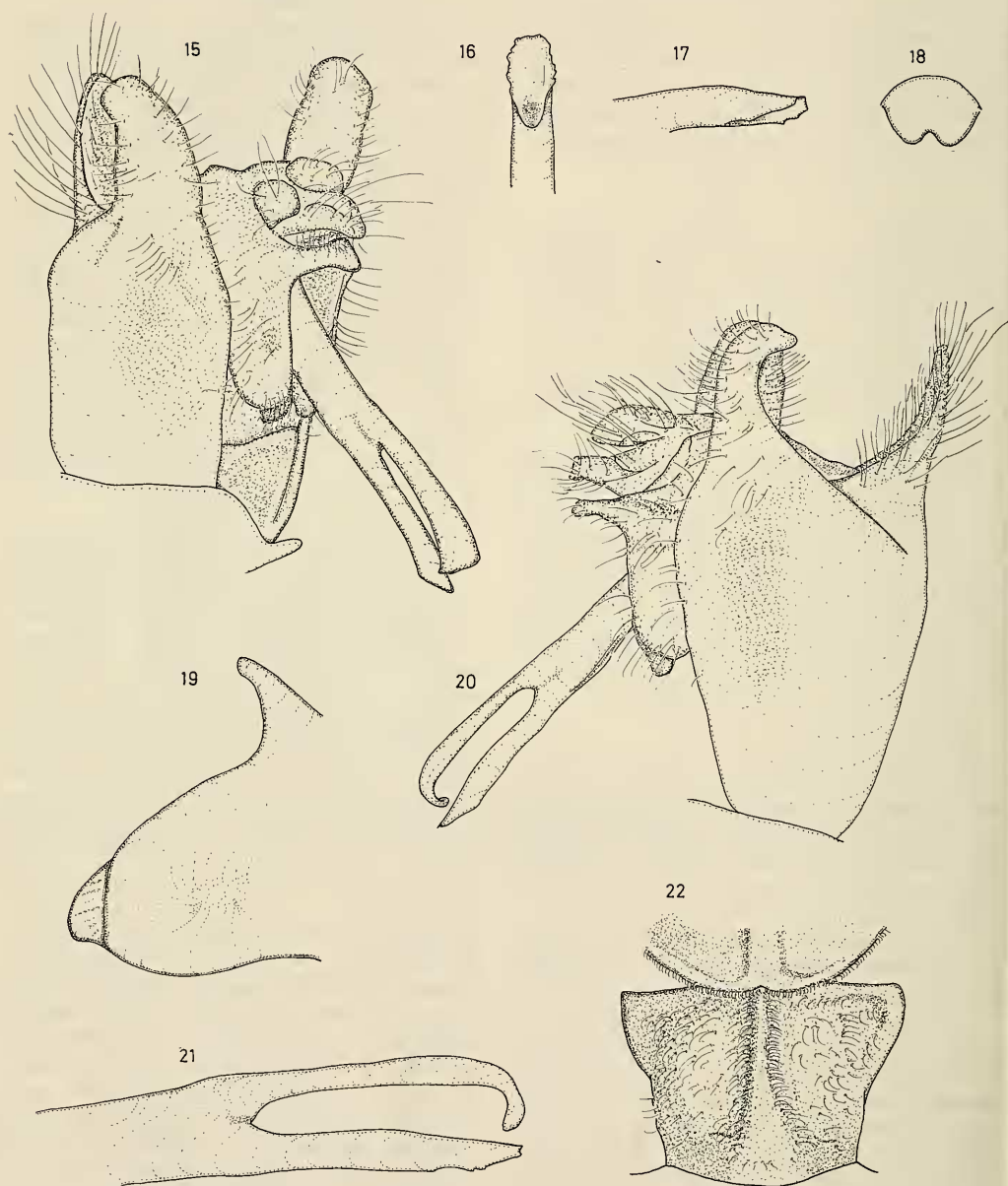
Abdomen. — Yellowish green coloured. Slender, slightly carinate in lateral view. Ovipositor sheath $0.36\text{--}0.51 \times$ length of abdomen.

Measurements of the types: body length δ : $14.8\text{--}17.5$ mm, $\bar{x} = 16.7 \pm 1.0$ mm, η : $19.1\text{--}20.8$, $\bar{x} = 19.9 \pm 0.5$ mm; width of pronotum collar δ : $4.8\text{--}5.4$ mm, $\bar{x} = 5.1 \pm 0.2$ mm, η : $5.9\text{--}6.6$ mm, $\bar{x} = 6.3 \pm 0.2$ mm; tegmen length δ : $19.4\text{--}21.5$ mm, $\bar{x} = 20.2 \pm 0.8$ mm, η : $22.9\text{--}24.8$ mm, $\bar{x} = 23.8 \pm 0.7$ mm.

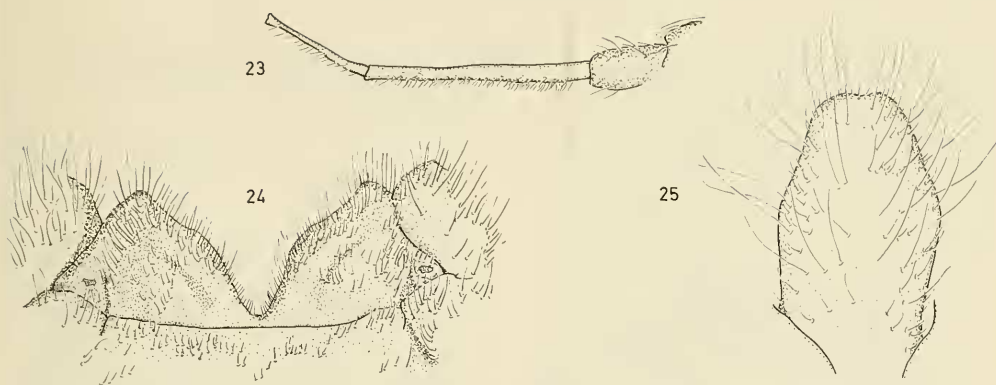
Distribution. — North Sulawesi (map 1).

Types. — Indonesia, Sulawesi: Holotype: "Stat. 16/Lowland rainforest/light-trap, site 1+2/understorey/canopy" (print), "Toraut/7—13.ii.1985/H. S. Barlow" (print), "Indonesia/Sulawesi Utara/Dumoga-Bone N.P./Project Wallace" (print), 1 δ (MZB). Paratypes: Sulawesi Utara, Dumoga-Bone N.P.: st. 9, lowl. rainf., MV light-trap, Page (= Barney's) Camp 302 m, 4—8.ii.1985, J. P. Duffels & J. D. Holloway, 1 δ (ZMA); st. 15, lowl. rainf., understorey/canopy, MV light-trap, Hog's Back Camp 492 m, 12—13.ii.1985, J. P. Duffels & J. D. Holloway, 1 η (MZB), 1 η (ZMA); same data as holotype, 1 η (MZB); st. 24, lowl. rainf., light-trap site 1, understorey, Toraut, 23—26.ii.1985, H. S. Barlow, 1 η (MZB), 1 δ 1 η (ZMA); st. 27, lowl. rainf., MV light-trap, understorey/canopy, Edwards Camp 664 m, 20.ii.1985, J. P. Duffels & J. D. Holloway, 1 η (MZB), 1 η (ZMA); Edwards Camp, iv.1985, J. H. Martin, 1 δ (BMNH); Kosingolan, guest-house P.P.A. headquarters, at lighth, 13.iv.1985, Charlotte Vermeulen, 1 η (ZMA); Toraut, Rothamsted light-trap, site 1, 200 m, v.1985, 1 δ 1 η (BMNH); surroundings Tumpah River, iii.1985, J. H. Martin, 1 η (BMNH).

Etymology. — The species is named after its distributional area, the Minahassa Peninsula (Sulawesi Utara).



Figs. 15—22. *Lembeja minahassae*, ♂. 15, pygofer, ventrolateral view, paratype Toraut; 16, 17, apex of aedeagus, paratype Toraut, 16, ventral view, 17, ventrolateral view; 18, apex of aedeagal appendage, ventral view, paratype Toraut; 19, clasper, lateral view, paratype Toraut; 20, pygofer, lateral view, paratype Toraut; 21, aedeagus with appendage, lateral view, paratype Toraut; 22, tergite 1, dorsal view, paratype Hog's Back Camp.



Figs. 23—25. *Lembeja minabassae*; 23, 25, ♂, paratype Toraut; 24, ♀, paratype Hog's Back Camp. 23, left antenna segm. 1—4, lateral view; 24, sternite 7, ventral view; 25, sternite 8, ventral view.

Remarks.

L. minabassae is very much alike the somewhat larger *L. foliata* but can be distinguished by the number of ridges on the tymbal, details in the genitalia and the distally more slender male abdomen.

Lembeja elongata n.sp. (figs. 26—35, map 1)

The species is described in comparison with *L. foliata* and *L. minabassae* after a series of specimens collected during the "Project Wallace" Expedition in the Dumoga-Bone N.P. (Sulawesi Utara). Relative sizes are based upon 10 male and 10 female type-specimens.

Description.

Somewhat larger than *L. foliata*, greenish abdomen may be more slender distally. Tegmina opaque. Head and thorax greenish. Head and pronotum together $1.0\text{--}1.21 \times$ as long as meso- and metanotum together. Head and thorax together in males $0.73\text{--}0.82 \times$, in females $0.74\text{--}1.0 \times$ as long as abdomen. Greatest width of body at the height of abdominal segment 3.

Head. — Generally as in *L. foliata*, though with somewhat larger eyes, each being $0.52\text{--}0.67 \times$ as wide as width of vertex in between eyes. Half of antennal segment 2 and onwards to apex of antennae dark coloured, combs on segments 3 and 4 not as dense as in *L. minabassae*. Distance between lateral ocelli $0.78\text{--}1.37 \times$ distance between lateral ocellus and eye. Head $1.52\text{--}1.79 \times$ as long as, $2.04\text{--}2.36 \times$ as wide as width of vertex in between eyes. Transverse ridges unicolorous.

Thorax. — Pronotum collar $1.56\text{--}1.80 \times$ as wide as width of head including eyes, $2.01\text{--}2.45 \times$ as wide as length of head. Four obconical areas clearly recognizable by light coloured patches, filled with some dark spots. Sometimes double-axed shaped dark-coloured mark on mesonotum. Sometimes dark median spot on cruciform elevation.

Legs. — As in *L. foliata*. All legs slightly darkening towards apex.

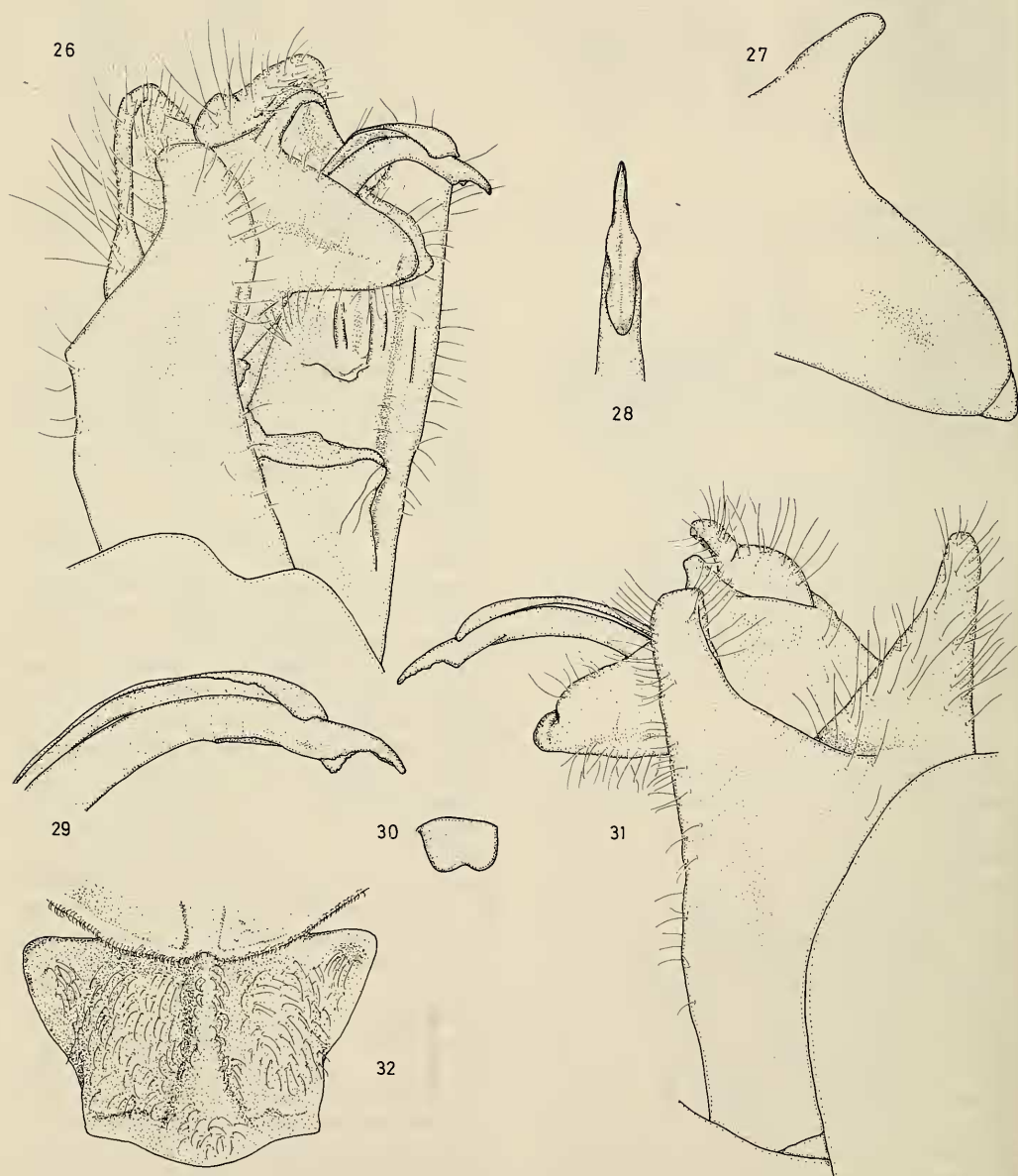
Tegmina and wings. — Tegmina only slightly greenish opaque, extreme base white with a slight red infuscation. Transverse vein of 2nd ulnar area just extending into the 3rd one. Third ulnar area $0.85\text{--}1.23 \times$ as long as 1st one; 4th ulnar area $0.89\text{--}1.10 \times$ as long as radial area. Veins of the wing whitish or greenish tinged. Cu_2 and A_1 fused at $69\text{--}83\%$ from their origin.

Male: Operculum. — Compared to *L. foliata* only a little larger. Meracanthus as in *L. foliata*.

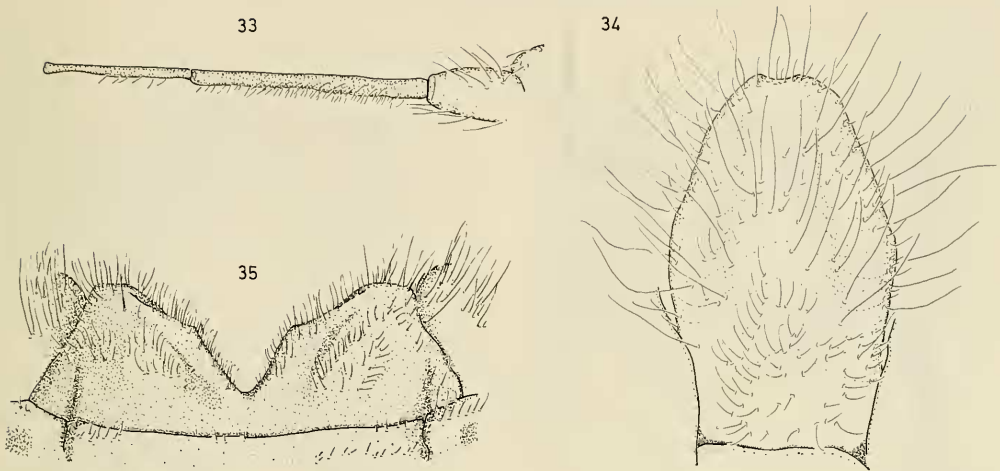
Abdomen. — Generally shaped as in *L. minabassae*. Folded membrane only slightly brownish tinged. Triangular shaped bulb on tergite 1 more narrowly attached. Proximal edge of tergite 1 sturdy and sometimes whitish coloured.

Tymbals. — Twenty-two long ridges alternating with an equal number of short ridges.

Genitalia. — Generally as in *L. foliata*. Lateral lobes of pygofer much more erect. Edge of lateral lobe running straightly downwards to base of pygofer. Claspers long and broad. Apex of aedeagus dorsally elongated by a slender, pointed projection. Dorsal aedeagal appendage weakly sclerotized, slightly incised at its round apex.



Figs. 26—32. *Lembeja elongata*, holotype. 26, pygofer, ventrolateral view; 27, clasper, lateral view; 30, apex of aedeagal appendage, ventral view; 31, pygofer, lateral view; 32, tergite 1, dorsal view.



Figs. 33–35. *Lembeja elongata*; 33, 34, ♂, holotype; 35, ♀, paratype Clarke's Camp. 33, left antenna segm. 1–4, lateral view; 34, sternite 8, ventral view; 35, sternite 7, ventral view.

Female: Operculum. — Small. Meracanthus reaching over sternite 3.

Abdomen. — Slender, carinate. Ovipositor sheath $0.43\text{--}0.53 \times$ as long as abdomen.

Measurements of the types: body length ♂: $18.3\text{--}21.7$ mm, $\bar{x} = 19.5 \pm 0.9$ mm, ♀: $19.1\text{--}22.2$ mm, $\bar{x} = 20.7 \pm 0.8$ mm; width of pronotum collar ♂: $5.5\text{--}6.6$ mm, $\bar{x} = 6.0 \pm 0.3$ mm, ♀: $6.2\text{--}7.5$ mm, $\bar{x} = 6.8 \pm 0.3$ mm; tegmen length ♂: $21.4\text{--}24.2$ mm, $\bar{x} = 22.7 \pm 0.8$ mm, ♀: $24.2\text{--}27.3$ mm, $\bar{x} = 25.3 \pm 0.8$ mm.

Distribution. — North Sulawesi (map 1).

Types. — Indonesia, Sulawesi: Holotype: "Stat. 19/Gardens/PPA rest-house/at light" (print), "Danau Moat/E of Kotamobagu/1200 m/18.ii.1985/J. P. Duffels" (partly handwritten, partly print; correct height: 1080 m), "Indonesia/Sulawesi Utara/Project Wallace" (print), 1 ♂ (MZB). Paratypes: Sulawesi Utara: Danau Moat, 22–25.iii.1985, 1 ♂ (BMNH), same locality, 20–22.x.1985, G. Robinson, 1 ♂ (ZMA); Dumoga-Bone N.P., Clarke's Camp (= "1440"), 1140 m, lightsheet, iii. 1985, J. H. Martin, 1 ♂ (BMNH), same data but: iv.1985, 2 ♂ (BMNH), v.1985, 1 ♂ 8 ♀ (BMNH), same locality but: 25.iii.1985, T. W. Harman, 1 ♂ 1 ♀ (MZB), 19–25.iii.1985, M. Allen, 1 ♀ (MZB), same locality but: 13–14.x.1985, B. Pitkin, 1 ♂ (MZB), 1 ♂ 2 ♀ (ZMA); Gunung Ambang, near Danau Moat, iv.1985, J. H. Martin, 3 ♂ (BMNH), same locality but: 11.xi.1986, M. J. D. Brendell, 3 ♂ 3 ♀ (ZMA); Gunung Mogogonipa, 1008 m, lightsheet, 20–22.v.1985, J. H.

Martin, 1 ♂ 1 ♀ (BMNH), same locality but with, 12.vi.1985, lightsheet, M. R. Wilson, 1 ♂ (BMNH), same locality but with, 18–20.x.1985, K. Tuck, 1 ♂ 1 ♀ (MZB), 2 ♂ 1 ♀ (ZMA).

Etymology. — The species is named after its elongated apex of the aedeagus.

Remarks.

L. elongata is very distinct by its typical apex of the aedeagus. The species is recorded only from an altitude of 1000–1200 m. It is very similar to the somewhat larger *L. dekkeri* n.sp. from which it can be distinguished only by characters of the male genitalia. They are probably confined to different altitudes.

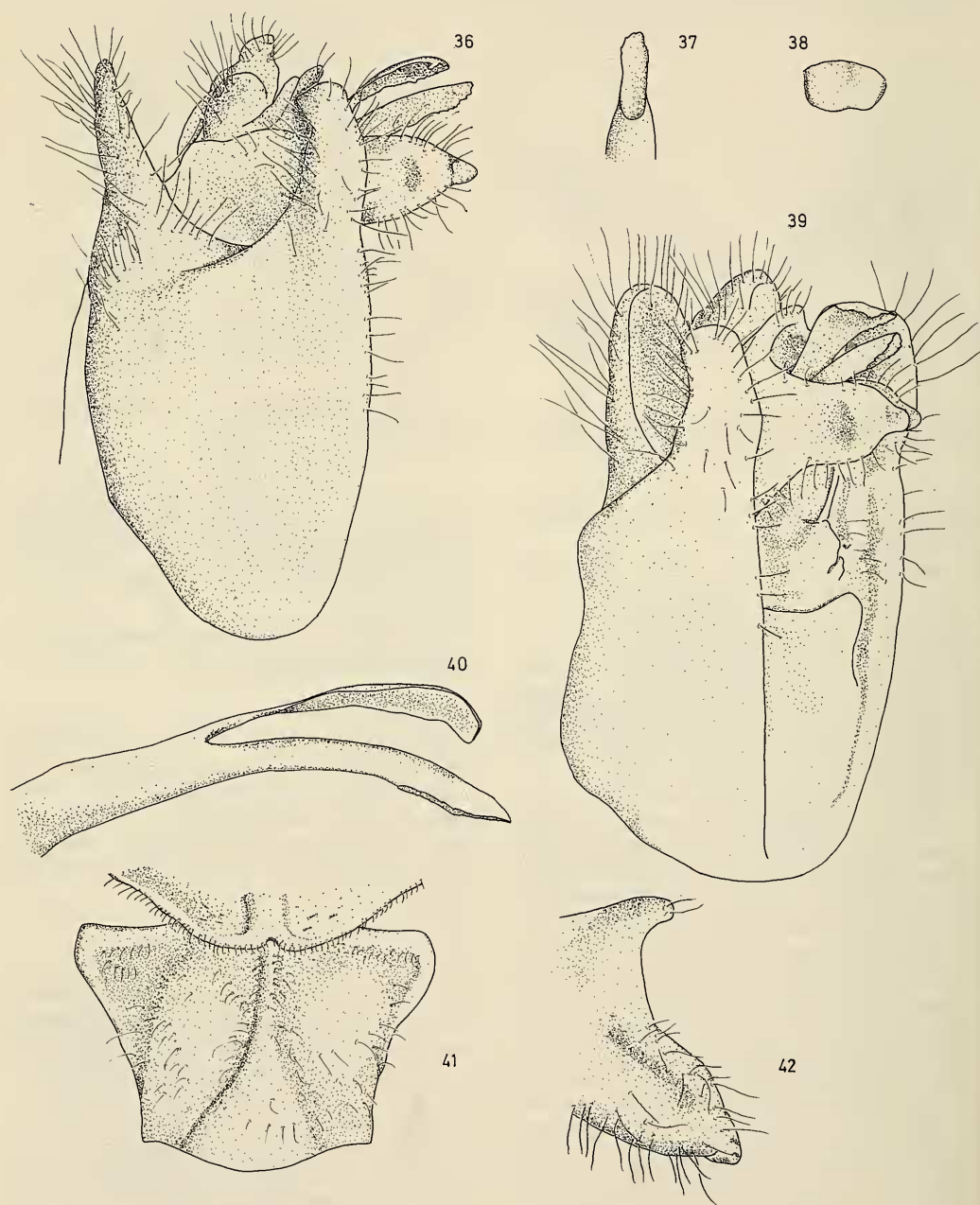
Lembeja dekkeri n.sp. (figs. 36–45, map 1)

This relatively large species (body length: $21.1\text{--}22.7$ mm) is described after four male and two female specimens; the description has been made in comparison with that of *L. elongata*.

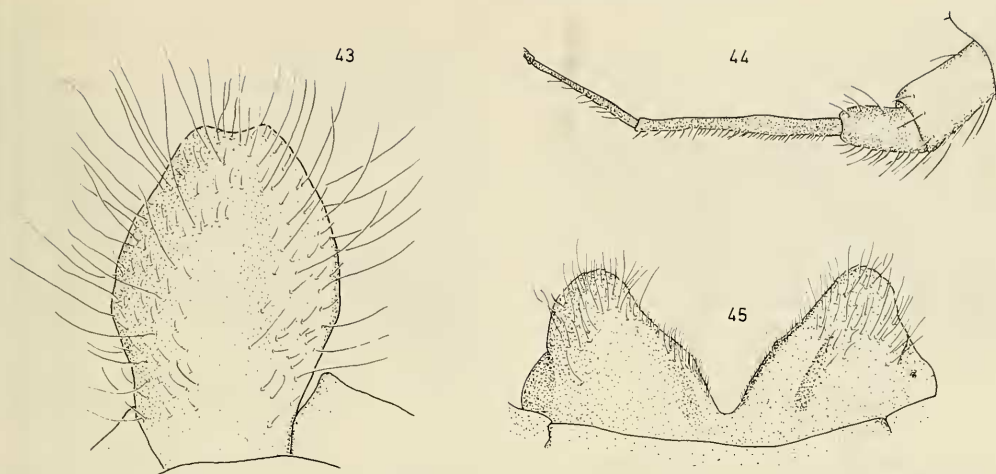
Description.

Green, relatively hairy, large species. Head and pronotum together $0.98\text{--}1.08 \times$ as long as meso- and metanotum together. Head and thorax together in males $0.70\text{--}0.76 \times$, in females $0.86 \times$ as long as abdomen. Greatest width of body at the height of abdominal segment 3.

Head. — Antennae from 2nd segment to apex dark-coloured, 4th segment with a weakly de-



Figs. 36—42. *Lembeja dekkeri*. 36, pygofer, lateral view, paratype; 37, apex of aedeagus, ventral view, paratype; 38, apex of aedeagal appendage, ventral view, holotype; 39, pygofer, ventrolateral view, paratype; 40, aedeagus with appendage, lateral view, holotype; 41, tergite 1, dorsal view, holotype; 42, clasper, lateral view, paratype.



Figs. 43—45. *Lembeja dekkeri*; 43, 44, ♂; 45, ♀, paratype. 43, sternite 8, ventral view, holotype; 44, left antenna segm. 1—4, lateral view, paratype; 45, sternite 7, ventral view.

veloped comb. Eyes $0.56\text{--}0.62 \times$ as wide as width of vertex between eyes. Distance between lateral ocelli $0.98\text{--}1.20 \times$ distance between lateral ocellus and eye. Head $1.50\text{--}1.72 \times$ as long as, $2.12\text{--}2.24 \times$ as wide as width of vertex in between eyes. Transverse ridges of postclypeus concolorous. Rostrum with dark apex reaching trochanter of middle leg.

Thorax. — Pronotum collar $1.67\text{--}1.84 \times$ as wide as width of head including eyes, $2.26\text{--}2.64 \times$ as wide as length of head. Four obconical areas on mesonotum slightly recognizable. Paratype with a black-coloured mark covering the two small median obconical areas.

Legs. — Legs darker coloured towards claws. Tibiae and pretarsi with apical dark patches.

Tegmina and wings. — Tegmina greenish opaque. Extreme base whitish with a slight red infuscation. Transverse vein of 2nd ulnar area extending just into 3rd ulnar area; continued by a distinct fold. Third ulnar area $1.03\text{--}1.20 \times$ as long as 1st one; 4th ulnar area $0.84\text{--}1.04 \times$ as long as radial area. Veins of the wings whitish and greenish tinged. Fusion of the Cu_2 and A_1 at $85\text{--}91\%$ of their length.

Male: Operculum. — Very small. Meracanthus reaching halfway over tymbal cavity.

Abdomen. — Large, light-greenish coloured. Tergite 1 as in *L. elongata*. Folded membrane white. Sternite 8 broad and distally rounded, only slightly incised.

Tymbals. — Nineteen to 22 long greyish

brown ridges alternating with 19—21 short orange brown ridges.

Genitalia. — Generally as in *L. elongata*. Mainly differing in the more pointed median part of uncus, the apex of the aedeagus not being prolonged, and the relatively larger dorsal aedeagal appendage.

Female: Operculum. — Small. Meracanthus reaching over sternite 3.

Abdomen. — Generally as in *L. elongata*. Ovipositor sheath $0.39 \times$ as long as abdomen.

Measurements of the types: body length ♂: $21.1\text{--}22.7$ mm, ♀: $21.7\text{--}22.4$ mm; width of pronotum collar ♂: $5.9\text{--}6.7$ mm, ♀: $7.4\text{--}7.8$ mm; tegmen length ♂: $23.3\text{--}24.8$ mm, ♀: $26.2\text{--}27.6$ mm.

Distribution. — North Sulawesi (map 1).

Types. — Indonesia, Sulawesi: Holotype: "stat.20/lower montane/raforest/MV light" (print), "Ice Station Zebra/Gn. Poniki-trail, ± 1520 m/23.x.1985/M. R. de Jong & M. J. D. Brendell" (print), "Indonesia/Sulawesi Utara/Dumoga-Bone N.P./Project Wallace" (print) 1 ♂ (ZMA). Paratype: Sulawesi Utara: Dumoga-Bone N.P., stat. 19, lower montane rainforest, Ice Station Zebra, Gn. Poniki-trail, ± 1570 m, 23.x.1985, R. W. R. J. Dekker, 1 ♂ (MZB), same locality but: 3.xi.1985, station: 081, R. Bosman & J. van Stalle, 2 ♂ 2 ♀ (BIN).

Etymology. — The species is named after Mr René Dekker, who captured the first specimen, after it flew against his throat.

Remarks.

There is an apparent correlation between body length, especially in the males, and altitude among *L. minabassae*, *L. elongata*, and *L. dekeri*. Within this small set of closely related species, which all are recorded from a different altitude, the species recorded from the lowest altitude (*L. minabassae*) is the smallest, while the one recorded from the highest altitude (*L. dekeri*) is the largest. Other small sets of species within the *foliata* group appear to show the same correlation (see also remarks on *L. oligorantha* n. sp. and *L. incisa* n. sp.).

***Lembeja pectinulata* n.sp.**

(figs. 46—55, map 2)

This small species is described after four males and three females.

Description.

Body pale brownish yellow (fresh specimens green, ventrally a little paler; one female in the material studied is deep chocolate-brown, including the tegmina and wings, which is probably an artifact). Head and pronotum together $1.03\text{--}1.19 \times$ as long as meso- and metanotum together. Thorax and head together in males $0.79 \times$, in females $0.87\text{--}1.19 \times$ as large as abdomen. Greatest width of body at the height of abdominal segment 3. It is the only species of the *L. foliata* group missing a dorsal aedeagal appendage.

Head. — Antennae dark from segment 2 to apex and with combs on segment 3. Eye small, in dorsal view $0.48\text{--}0.55 \times$ as wide as vertex width in between eyes. Ocelli slightly raised, distance between lateral ocelli $0.96\text{--}1.30 \times$ distance between lateral ocellus and eye. Head $1.50\text{--}1.59 \times$ as long as, $1.97\text{--}2.10 \times$ as wide as width of vertex in between eyes. Transverse ridges of postclypeus distinct in lateral view, concolorous. Rostrum with dark apex reaching trochanter of middle legs.

Thorax. — Pronotum collar $1.56\text{--}1.70 \times$ as wide as width of head including eyes, $1.94\text{--}2.35 \times$ as wide as length of head. Four pale obconical spots can hardly be discerned on the mesonotum; specimen from Tangkoko with large double-axe shaped, brown mark situated medially.

Legs. — Concolorous with underside of thorax. Fore femora bearing three spines: basal one longest and blunt, middle and distal small spines both acutely pointed. Fore tibiae with a brown

patch apically, and a somewhat paler brown patch at $1/3$ of its length.

Tegmina and wings. — Tegmina subhyaline to slightly greenish opaque; spotted with red along veins and inside cells of the tegmen (basically as in *L. foliata*). Venation whitish, extreme base white, costa milky. Transverse vein of 2nd ulnar area just extending into the 3rd one; continued by a fold. Node halfway M_{3+4} . Third ulnar area $0.93\text{--}1.0 \times$ as long as 1st one; 4th ulnar area $0.94\text{--}1.0 \times$ as long as radial area. Wings pale-hyaline, fusion of Cu_2 and A_1 at $85\text{--}91\%$ of their length.

Male: Operculum. — Extremely small and narrow. Meracanthus reaching over tymbal cavity.

Abdomen. — Medial ridge of tergite 1 ends distally in a small triangular bulb. Two lateral sclerotized flaps of tergite 1 not acutely pointed. Sternite 8 very short and broadly rounded.

Tymbals. — Twenty-three long ridges alternating with short brown ridges.

Genitalia. — Caudal dorsal beak relatively short and broadly rounded. Lateral lobes of pygofer fairly short, apical part of edge running straight downwards from lateral lobe to base of pygofer. Claspers in lateral view straight and narrow, nail-shaped protrusion relatively large. Median uncus part small and pointed medially. Aedeagus with large, tooter-shaped, apex (figs. 48—50), toothed along its edge.

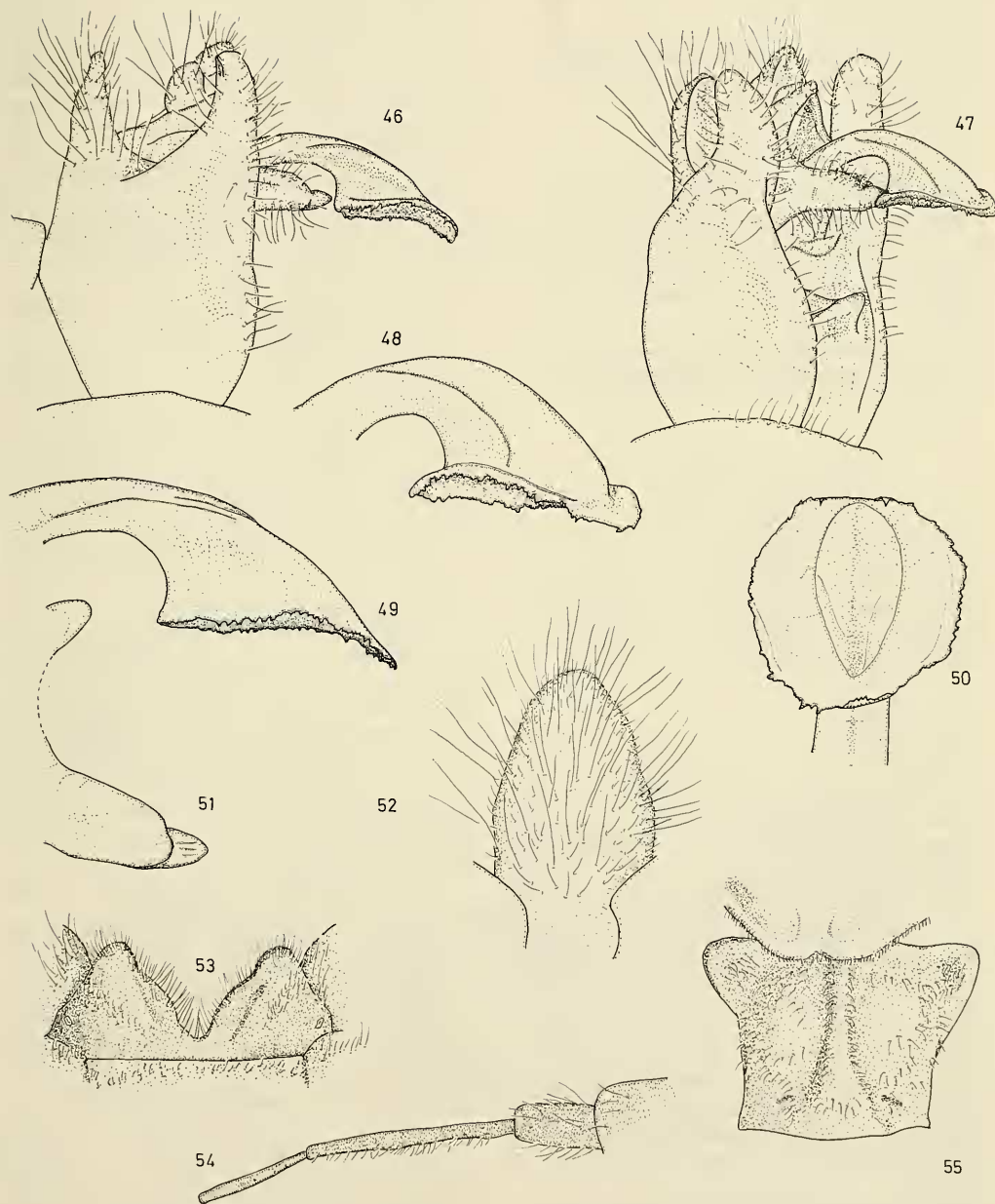
Female: Operculum. — Small, more or less sickle-shaped. Meracanthus reaching sternite 3.

Abdomen. — Slender, carinate. Ovipositor sheath $0.39\text{--}0.46 \times$ as long as abdomen.

Measurements of the types: body length ♂: $15.4\text{--}16.1$ mm, ♀: $14.4\text{--}16.0$ mm; width of pronotum collar ♂: $4.3\text{--}4.5$ mm, ♀: $4.9\text{--}5.5$ mm; tegmen length ♂: $17.1\text{--}19.3$ mm, ♀: $19.6\text{--}20.1$ mm.

Distribution. — North Sulawesi (map 2).

Types. — Indonesia, Sulawesi: Holotype: "Nord Celebes/Toli-Toli/Nov.—Dez. 1895/H. Fruhstorfer" (print), "*Lembeja*/n.sp." (handwritten), "Coll. A. Jacobi/1911—5" (print, yellow label), "Staatl. Museum für Tierkunde Dresden" (print), 1 ♂ (SMD). Paratypes: Sulawesi Utara: Dumoga-Bone N.P., Tumpah River, predated by jumping spider, 27.ix.1985, R. Wiles, 1 ♂ (ZMA); Percy, Tangkoko N.P., at light, 2—3.xi.1985, M. J. D. Brendell, 1 ♂ (ZMA); Toli-Toli, xi—xii.1895, H. Fruhstorfer, *Lembeja fruhstorferi*, 1 ♀ (BIN), same data but: Distant coll. 1911—353, 1 ♀ (BMNH), *Lembe-*



Figs. 46—55. *Lembeja pectinulata*; 46—52, 54, 55, ♂, holotype; 53, ♀, paratype Toli-Toli. 46, 47, pygofer, 46, lateral view, 47, ventrolateral view; 48—50, apex of aedeagus, 48, ventrolateral view, 49, lateral view, 50, ventral view; 51, clasper, lateral view; 52, sternite 8, ventral view; 53, sternite 7, ventral view; 54, left antenna segm. 1—4, lateral view; 55, tergite 1, dorsal view.

ja maculosa Distant 147.vii.13 ♀ (= Distant, 1892: p. 147, Pl. 7 fig. 13), 1 ♀ (MHNG). Specimens without precise locality: India Archipel, 1867, 1 ♂ (CNMW).

Etymology. — This is the first species in which the antennal comb on antennal segment 3 has been recognized. *Pectinulata* stands for "provided with a little comb".

Remarks.

L. pectinulata is the only species within the *L. foliata* group missing a dorsal aedeagal appendage. Whether this is caused by a fusion of the dorsal aedeagal appendage with the aedeagus itself or the loss of the appendage is still under study.

Furthermore, the tymbals of *L. pectinulata* have the highest number of ridges within the *foliata* group.

Lembeja sangihensis n.sp. (figs. 55—56, map 2)

The species is described after two males and one female, which are not in a very good condition. As it is very peculiar in its aedeagal apex and as it is the only species from Sangihe known in the male sex, I believe its description as a separate species is justified.

Description.

Body ochraceous brown. Head and pronotum together $1.14\text{--}1.18 \times$ as long as meso- and metanotum together. Thorax and head together in males 0.83 , in the female $0.88 \times$ as long as abdomen. Greatest width of body at the height of abdominal segment 3.

Head. — Antennae dark coloured from segment 2 to apex; combs present on segment 3 and 4. Eye small, $0.49\text{--}0.55 \times$ as wide as vertex width between eyes. Ocelli slightly raised, distance between lateral ocelli in males $0.79\text{--}0.91$, in the female $1.14 \times$ distance between lateral ocellus and eye. Head $1.50\text{--}1.59 \times$ as long as, $1.98\text{--}2.10 \times$ as broad as width of vertex between eyes. Concolorous transverse ridges of postclypeus distinct in lateral view. Rostrum with its black apex reaching trochanter of middle leg.

Thorax. — Pronotum collar $1.61\text{--}1.67 \times$ as wide as width of head including eyes, $2.12\text{--}2.24 \times$ as wide as length of head. Four obconical areas indicated by patches.

Legs. — Concolorous with ventral part of thorax. Fore tibiae with two darker coloured

patches, one basally, one apically, as in *L. pectinulata*. Fore femora with three spines, basal longest one slightly pointed, middle- and small apical one pointed.

Tegmina and wings. — Tegmina subhyaline, yellow-brownish glossy. Venation light-ochraceous. Extreme base whitish. Spotted with red along the veins and inside the tegmen areas (alike *L. foliata*). Transverse vein of 2nd ulnar area slightly extending into the 3rd one, continued by a slight fold. Third ulnar area $0.97\text{--}1.02 \times$ as long as 1st one; 4th ulnar area $0.98\text{--}1.1 \times$ as long as radial area. Wings pale-hyaline, extreme base whitish. Fusion of the Cu_2 and A_1 at $74\text{--}84\%$ from their origin.

Male: Operculum. — Small, meracanthus reaching over tymbal cavity.

Abdomen. — Pale-brownish. Distinctly carinated. Tergite 1 with its medial ridge ending in a triangular shaped bulb of moderate size, attached to tergite 2. Sclerotized flaps not extremely pointed. Proximal border of tergite 1 sturdy and whitish. Sternite 8 about triangular-shaped with a round apex.

Tymbals. — Provided with 21 long ridges alternating with an equal number of short, orange-brown coloured ridges.

Genitalia. — Caudal dorsal beak reaching just beyond anal valves, lateral lobes of pygofer slender. Edge running downwards from lateral lobe to base of pygofer nearly straight. In lateral view claspers fairly short and sturdy. Median uncus part fairly broad and apically pointed. Aedeagus stout, armoured laterally with a distinct ridge (fig. 57). Basally narrow aedeagal appendage unsclerotized, with an almost straight apex, not reaching apex of aedeagus.

Female: Operculum. — About sickle-shaped. Meracanthus just reaching sternite 3.

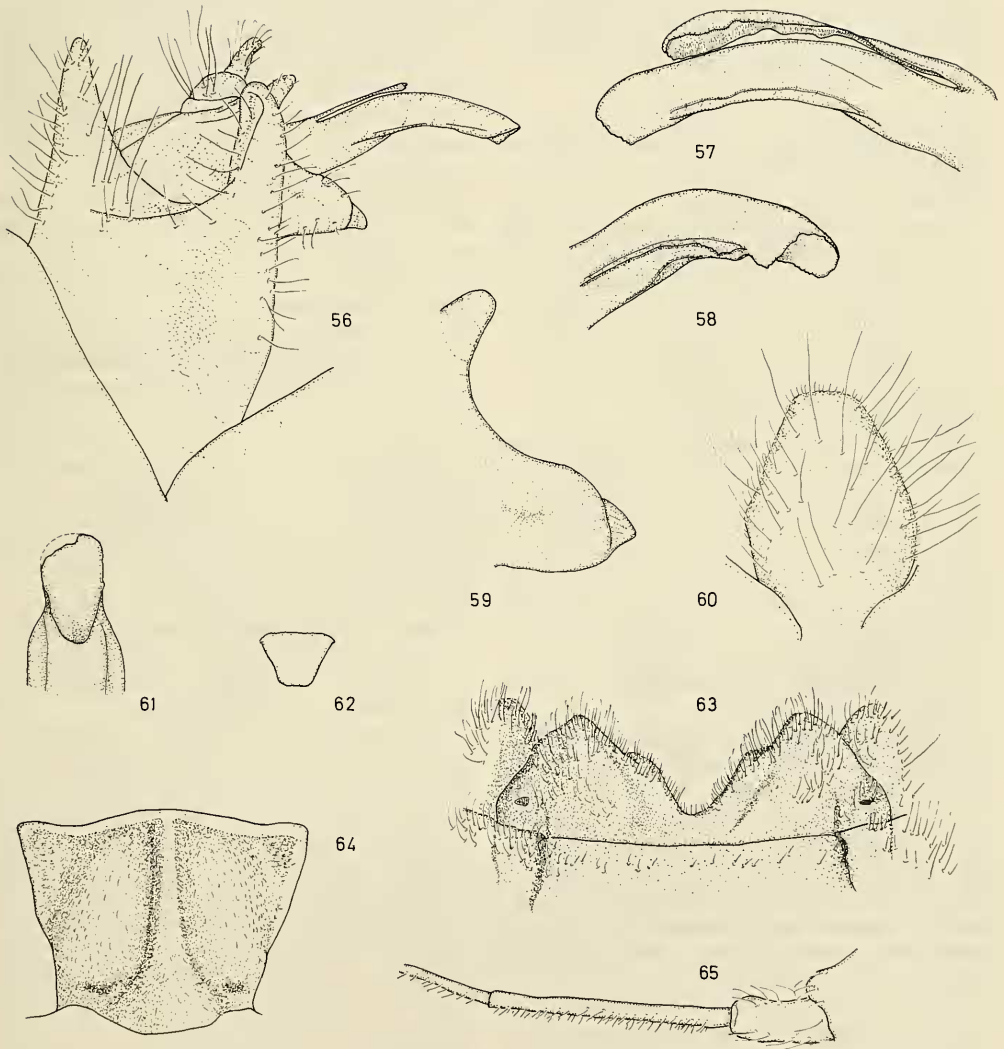
Abdomen. — Slender, carinate. Ovipositor sheath $0.36 \times$ as long as abdomen.

Measurements of the types: Body length ♂: $15.9\text{--}16.5$ mm, ♀: 22.6 mm; width of pronotum collar ♂: 5.1 mm, ♀: 6.5 mm; tegmen length ♂: 19.9 mm.

Distribution. — Sangihe island (map 2).

Types. — Indonesia, Sangihe: Holotype: "Sanghir/(Doherty)" (handwritten), "*Jacatra typica?*" (handwritten), "Distant Coll./1911-383" (print), "Brit. Mus." (print) 1 ♂ (BMNH). Paratypes: same data as holotype, 1 ♂ (BMNH); Faroena (= Tahuna?), J. H. Jurriaanse, 1 ♀ (RMNH).

Etymology. — The species derives its name from its distributional area, Sangihe island.



Figs. 56—65. *Lembeja sangibensis*; 56—62, 64, ♂; 63, 65, ♀, paratype. 56, pygofer, lateral view, paratype; 57, aedeagus with appendage, lateral view, paratype; 58, apex of aedeagus, ventrolateral view, paratype; 59, clasper, lateral view, paratype; 60, sternite 8, ventral view, holotype; 61, apex of aedeagus, ventral view, paratype; 62, apex of aedeagal appendage, ventral view, holotype; 63, sternite 7, ventral view; 64, tergite 1, dorsal view, holotype; 65, left antenna segm. 1—4, lateral view.

Remarks.

L. sangihensis is very typical in its aedeagus and its unsclerotized, basally narrow aedeagal appendage.

***Lembeja hollowayi* n.sp.**

(figs. 66—76, 141, 142, map 2)

This small species has been collected by Dr J. P. Duffels and Dr J. D. Holloway in the Dumoga-Bone N.P., and by Dr J. P. Duffels and Mrs M. J. Duffels in Central Sulawesi.

Description.

Body yellowish green, sometimes with black spots. Thorax with black coloration dorsally. Red spots along the tegmen veins conspicuous. Body males more elongate in comparison to all other species of the *foliata* group, that have a more rounded or triangularly shaped body. Head and pronotum $1.06\text{--}1.26 \times$ as long as meso- and metanotum together. Head and thorax in males $0.67\text{--}0.88$, in females $0.79\text{--}1.0 \times$ as long as abdomen. Greatest width of body at the height of abdominal segment 3.

Head. — Antennae black coloured from 2nd segment to apex; combs present on segments 3 and 4. Females sometimes with black coloration on supra-antennal plates and area between ocelli. Eye rather large, $0.53\text{--}0.60 \times$ as wide as vertex between eyes. Distance between lateral ocelli $0.9\text{--}1.6 \times$ distance between lateral ocellus and eye. Head $1.35\text{--}1.77 \times$ as long as, $1.99\text{--}2.26 \times$ as wide as width of vertex between eyes. Rostrum with its black apex reaching trochanter of middle leg.

Thorax. — Pronotum collar usually with a black spot, which may continue as a black medial fascia on the pronotum. Pronotum collar $1.51\text{--}1.74 \times$ as wide as width of head, $1.98\text{--}2.47 \times$ as wide as length of head. Mesonotum with dark-brown mark on cruciform elevation. Some specimens with a large double-axe-shaped marking between small paramedian obconical areas and cruciform elevation; paramedian areas with a small brown-black spot.

Legs. — Concolorous. Fore tibiae with two conspicuous dark-coloured spots, placed as in *L. pectinulata* and *L. sangihensis*. Armature of fore femora as in *L. sangihensis*.

Tegmina and wings. — Tegmina hyaline. Veins of tegmina yellow to green coloured; costa and extreme base of tegmen whitish. Red spots along veins conspicuous; spots in cells of tegmen relatively faint. Tegmen-border with larger spots placed medially at apex of apical

areas. Large dark red spot at apex of Cu_{1b} . Third ulnar area $0.87\text{--}1.13 \times$ as long as 1st one; 4th ulnar area $0.86\text{--}1.04 \times$ as long as radial area. Wings with yellowish white veins; fusion of the Cu_2 and A_1 at $78\text{--}90\%$ from their origin.

Male: Operculum. — Small, extending just over tymbal cavity; meracanthus long, may reach sternite 2.

Abdomen. — Green, sometimes slightly pale-green, coloured. Tergite 1 with its medial ridge ending distally in a triangular bulb of relatively moderate size. Sturdy proximal edge slightly concave near each of the hardly pointed, sclerotized flaps. Sternite 8 apically rounded.

Tymbal. — Provided with $18\text{--}19$ long ridges, alternating with medially short orange-brown ridges.

Genitalia. — Caudal dorsal beak of moderate size, rounded apically. Lateral lobes of pygofer long and slender, in lateral view reaching just beyond caudal dorsal beak, strongly diverging in ventral view. Edge running downwards from lateral lobe to base of pygofer only slightly rounded. Claspers bulbous and sturdy, very conspicuous in ventral view; nail-shaped protrusion very small. Median uncus part smoothly narrowing into a pointed projection. Apex of aedeagus characteristic (fig. 70). Sclerotized dorsal aedeagal appendage with broad, incised apex, reaching apex of aedeagus.

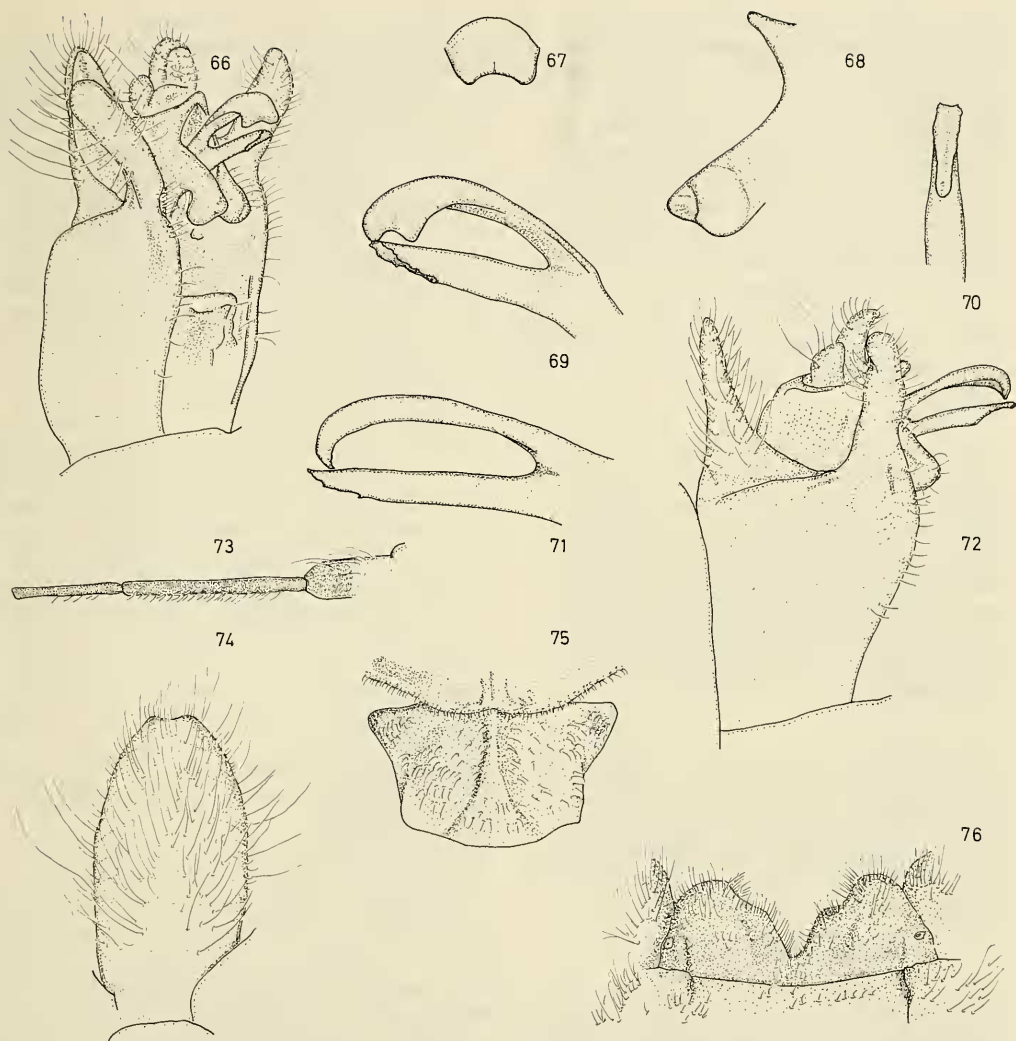
Female: Operculum. — Small, rounded and sickle-shaped. Meracanthus reaching sternite 2.

Abdomen. — Carinate, ovipositor sheath $0.35\text{--}0.48 \times$ as long as abdomen.

Measurements of the types: body length δ : $13.4\text{--}15.5$ mm, $\bar{x} = 14.7 \pm 0.6$ mm, η : $14.6\text{--}16.8$ mm, $\bar{x} = 15.8 \pm 0.7$ mm; width of pronotum collar δ : $4.2\text{--}4.9$ mm, $\bar{x} = 4.5 \pm 0.2$ mm, η : $4.5\text{--}5.7$ mm, $\bar{x} = 5.2 \pm 0.3$ mm; tegmen length δ : $16.3\text{--}17.9$ mm, $\bar{x} = 17.2 \pm 0.7$ mm, η : $17.8\text{--}20.9$ mm, $\bar{x} = 19.2 \pm 0.8$ mm.

Distribution. — North and Central Sulawesi (map 2).

Types. — Indonesia, Sulawesi: Holotype: "Stat. 15/Lowland rainforest/understorey/canopy/MV light-trap" (print), "Hog's Back Camp/600 m, S-side of/ridge, 12—13.ii.1985/J. P. Duffels & J. D. Holloway" (print), "Indonesia/Sulawesi Utara/Dumoga-Bone N.P./Project Wallace" (print), 1 δ (MZB). Paratypes: Sulawesi Utara, Dumoga Bone N.P.: Edwards Camp 664 m, st. 27, MV light-trap, understorey/canopy, 22.ii.1985, J. P. Duffels & J. D. Holloway, 1 η (ZMA); Hog's Back Camp 492



Figs. 66—76. *Lembeja hollowayi*; 66—75, ♂; 76, ♀, paratype Hog's Back Camp. 66, pygofer, ventrolateral view, paratype Toraut; 67, apex of aedeagal appendage, ventral view, paratype Toke Pangana; 68, clasper, lateral view, paratype Toke Pangana; 69, aedeagus with appendage, ventrolateral view, paratype Toke Pangana; 70, apex of aedeagus, ventral view, paratype Toke Pangana; 71, aedeagus with appendage, lateral view, paratype Toke Pangana; 72, pygofer lateral view, paratype Toraut; 73, left antenna segm. 2—4, lateral view, paratype, Toke Pangana; 74, sternite 8, ventral view, holotype; 75, tergite 1, dorsal view, holotype; 76, sternite 7, ventral view.

m, st. 13, lowl. rainf., MV light-trap, canopy, N-side of ridge, 10—11.ii.1985, J. P. Duffels & J. D. Holloway, 1 ♀ (MZB), 2 ♀ (ZMA), same data but: st. 15, understorey/canopy, MV light-trap, S-side of ridge, 12—13.ii.1985, 1 ♀ (MZB), 1 ♂ (ZMA), same data but: st. 30A, MV light-trap, canopy, 14.ii.1985, J. D. Holloway, 1

♀ (MZB), 1 ♂ 2 ♀ (ZMA); Page (= Barney's) Camp 302 m, st. 9, lowl. rainf., MV light-trap, 4—8.ii.1985, J. P. Duffels & J. D. Holloway, 1 ♂ (MZB); Toraut, st. 7, lowl. rainf., MV light-trap, 1—2.ii.1985, J. P. Duffels & J. D. Holloway, 1 ♀ (MZB), 2 ♀ (ZMA), same data but: st. 16, light-trap site 1+2, understorey/canopy,

7—13.ii.1985, H. S. Barlow, 1 ♀ (MZB), 1 ♀ (ZMA), same data but: st. 23, light-trap site 2, 26.ii.1985, 1 ♂ 1 ♀ (MZB), 1 ♂ 2 ♀ (ZMA), same data but: st. 24, light-trap site 1, 15—26.ii.1985, 1 ♀ (MZB), 1 ♂ 2 ♀ (ZMA); Tumpah River; st. 34, secondary forest, 26—29.ii.1985, J. P. Duffels, 1 ♀ (ZMA). Sulawesi Tengah, Lore Lindu N.P.: Marena, Hihia 360 m, 10 km NE Gimpu, st. 48, lowl. rainf. riverbank, ML-light, 19.iii.1985, J. P. & M. J. Duffels, 1 ♂ 1 ♀ (ZMA), same data but: st. 49, 400 m, along narrow stream, 20.iii.1985, 2 ♂ (ZMA); Toke Pangana 700 m, st. 44, 4 km NE Gimpu, 16.iii.1985, J. P. & M. J. Duffels, 1 ♂ 4 ♀ (ZMA).

Etymology. — The species is named after the distinguished British lepidopterist Dr J. D. Holloway (Commonwealth Institute of Entomology), the Director of the Diversity and Conservation Programme of the "Project Wallace" Expedition. Dr Holloway has made important contributions to the knowledge and understanding of distribution patterns in the Indo-Pacific. He stimulated the study of the biogeography of cicadas in this region, e.g. by his extensive collecting.

Remarks.

L. hollowayi and *L. oligorhanta* n.sp., characterized by their bulbous claspers and diverging lateral lobes, are closely related. Differences are found in the shape of the aedeagal appendage, the density of red spots on the tegmina and the body size.

Lembeja oligorhanta n.sp.

(figs. 77—86, map 2)

The species is described in comparison with *L. hollowayi*, after two males and five females, all from the Lore-Lindu N.P. in Central Sulawesi.

Description.

Larger than *L. hollowayi*. Body green, thorax sometimes with black coloration dorsally. Red spots along veins in tegmina usually only present in basal half. Head and pronotum 1.03—1.16 × as long as meso- and metanotum together. Head and thorax in males 0.8—0.9, in females 0.77—1.01 × as long as abdomen. Greatest width of body at the height of pronotum collar.

Head. — Antennae black coloured from 2nd segment to apex; combs present on segments 3 and 4. Females sometimes with black coloration

between eyes, on supra-antennal plates and postclypeus. Eyes rather large, 0.53—0.67 × as wide as vertex between eyes. Distance between lateral ocelli 0.90—1.37 × distance between lateral ocellus and eye. Head 1.39—1.77 × as long as, 2.14—2.32 × as wide as width of vertex between eyes. Rostrum as in *L. hollowayi*.

Thorax. — Pronotum collar usually with a black spot, which may continue in a broad, black, medial fascia on pronotum. Pronotum collar 1.54—1.78 × as wide as width of head, 2.0—2.63 × as wide as length of head. Mesonotum, and its eventual black markings, as in *L. hollowayi*.

Legs. — As in *L. hollowayi*.

Tegmina and wings. — Tegmina hyaline. Coloration of venation as in *L. hollowayi*. Red spots along veins usually only conspicuous in basal part of tegmen, spots within cells of tegmen usually not present, except at tegmen-border at the height of apical area 8. Third ulnar area 0.93—1.09 × as long as 1st one; 4th ulnar area 0.88—0.95 × as long as radial are. Wings as in *L. hollowayi*, fusion of Cu_2 and A_1 at 82—91%.

Male: Operculum. — Relatively larger than in *L. hollowayi*, meracanthus just not reaching sternite 2.

Abdomen. — Green. Tergite 1 with a very small triangular-shaped bulb. Other features as in *L. hollowayi*.

Tymbal. — Provided with 21 long ridges alternating with medial short brown ridges.

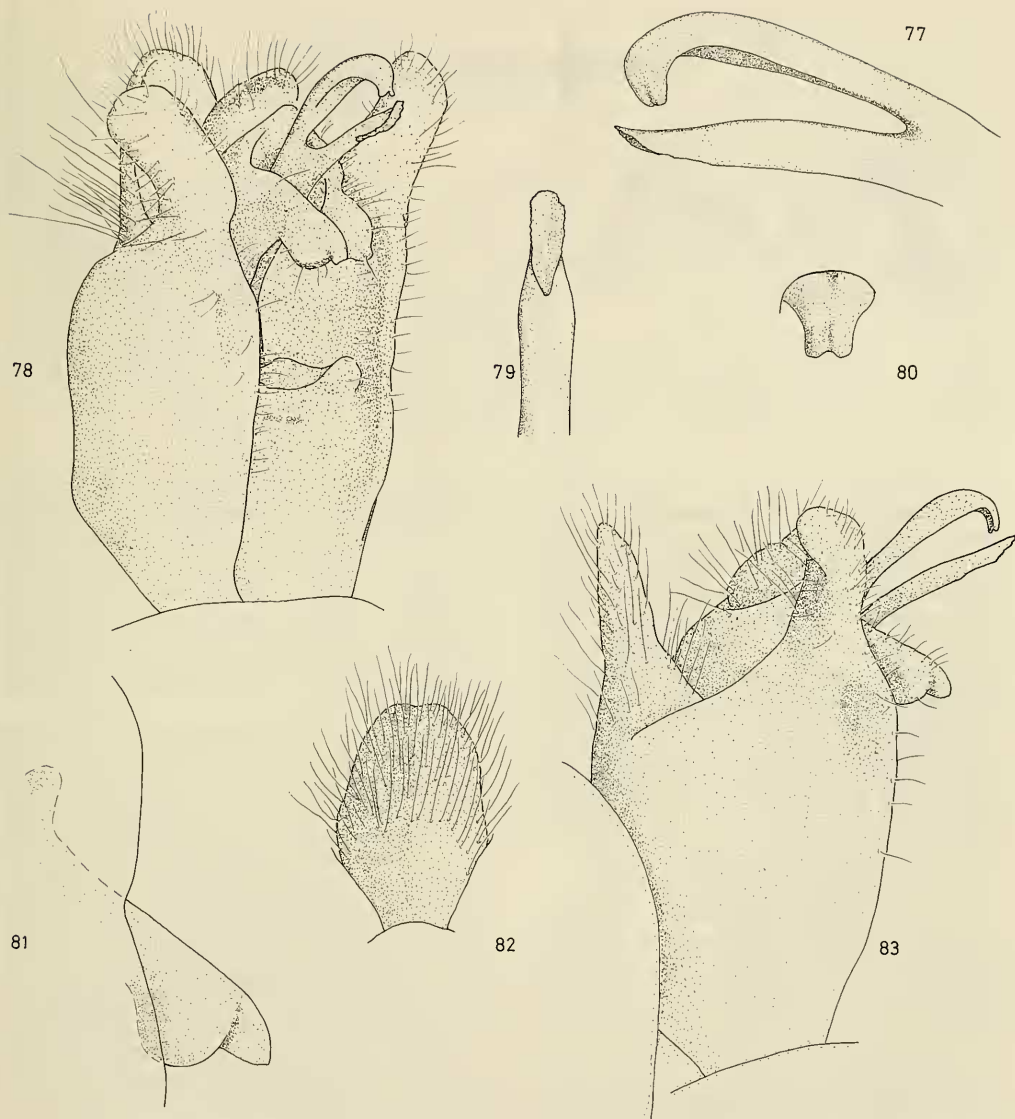
Genitalia. — Caudal dorsal beak of moderate size, rounded apically. Lateral lobes less slender than in *L. hollowayi*, diverging in ventral view. Edge running downwards from lateral lobe to base of pygofer only slightly rounded. Claspers less bulbous than in *L. hollowayi*, nail-shaped protrusion larger than in *L. hollowayi*. Median uncus part less pointed than in *L. hollowayi*. Apex of aedeagus as in fig. 79. Small, tapering apex of sclerotized dorsal aedeagal appendage slightly incised, reaching apex of aedeagus.

Female: Operculum. — As in *L. hollowayi*. Meracanthus usually reaching over sternite 3.

Abdomen. — As in *L. hollowayi*. Ovipositor sheath 0.38—0.47 × as long as abdomen.

Measurements of the types: body length ♂: 18.4 mm, ♀: 18.4—19.1 mm, $\bar{x}$ = 18.8 ± 0.3 mm; width of pronotum collar ♂: 4.7—5.5 mm, ♀: 6.1—6.5 mm, $\bar{x}$ = 6.21 ± 0.2 mm; tegmen length ♂: 20.5—21.3 mm, ♀: 21.7—24.1 mm, $\bar{x}$ = 22.6 ± 0.8 mm.

Distribution. — Central Sulawesi (map 2).

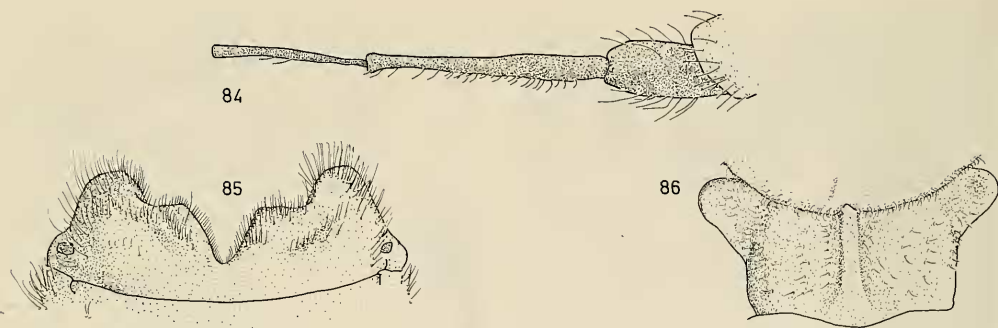


Figs. 77—83. *Lembeja oligorhanta*; 77—81, 83, holotype, 82, ♂, paratype. 77, aedeagus with appendage, ventrolateral view; 78, pygofer, ventrolateral view; 79, apex of aedeagus, ventral view; 80, apex of aedeagal appendage, ventral view; 81, clasper, lateral view; 82, sternite 8, ventral view; 83, pygofer, lateral view.

Types. — Indonesia, Sulawesi: Holotype: "Museum Leiden Sulawesi/Palu, 50 km SE of: Lore/Lindu NP, Dongi Dongi sh./UTM SJ 86; 950 m; 3 Dec. 1985 B/ Van Tol & Krikken" (partly print, partly handwritten), 1 ♂ (RMNH). Paratypes: Sulawesi Tengah, Lore-Lindu N.P.: same data as holotype but: 4.xii.1985, 1 ♂ 1 ♀ (RMNH), same data but:

4—9.xii.1985, 2 ♀ (RMNH), same data but: 7.xii.1985, 1 ♀ (ZMA), same locality but: st. 52, ML-light, 90 km SE of Palu, 23.iii.1985, J. P. & M. J. Duffels, 1 ♀ (ZMA).

Etymology. — The name of the species refers to its sparsely spotted tegmina. "Oligo" (Greek) stands for little, and "rhanta" (Greek) for sprinkled.



Figs. 84—86. *Lembeja oligorbhanta*, 84, 86, holotype, 85, ♀, paratype. 84, left antenna segm. 2—4, lateral view; 85, sternite 7, ventral view; 86, tergite 1, dorsal view.

Remarks.

L. oligorbhanta is easily distinguished from the other species of the *foliata* group, because of its hardly spotted tegmina. It appears to be most closely related to *L. hollowayi*, which is strongly suggested by the shape of the lateral lobes and the claspers. Though both present in Central Sulawesi, they are probably confined to a different altitude, as can be read from the data (*L. hollowayi*: 200—700 m; *L. oligorbhanta*: 950 m). A difference in size between the two species is also apparent. A discussion on a possible relation between size and altitude is given in the remarks on *L. incisa* n.sp.

Lembeja mirandae n.sp. (figs. 87—96, map 2)

This species, one of the largest of the *foliata* group, is described after one male and one female from the Lore-Lindu N.P. in Sulawesi Tengah.

Description.

Fairly large and robust species coloured with brown, yellow to pale-ochraceous and black. Ventrally pale-ochraceous. Pigmentation of apical cells of the tegmen with relatively large, dark-red spots. Head and pronotum together $1.15\text{--}1.18 \times$ as long as meso- and metanotum together. Head and thorax in the males $0.76 \times$, in the females $0.87 \times$ as long as abdomen. Greatest width of body at the height of abdominal segment 3.

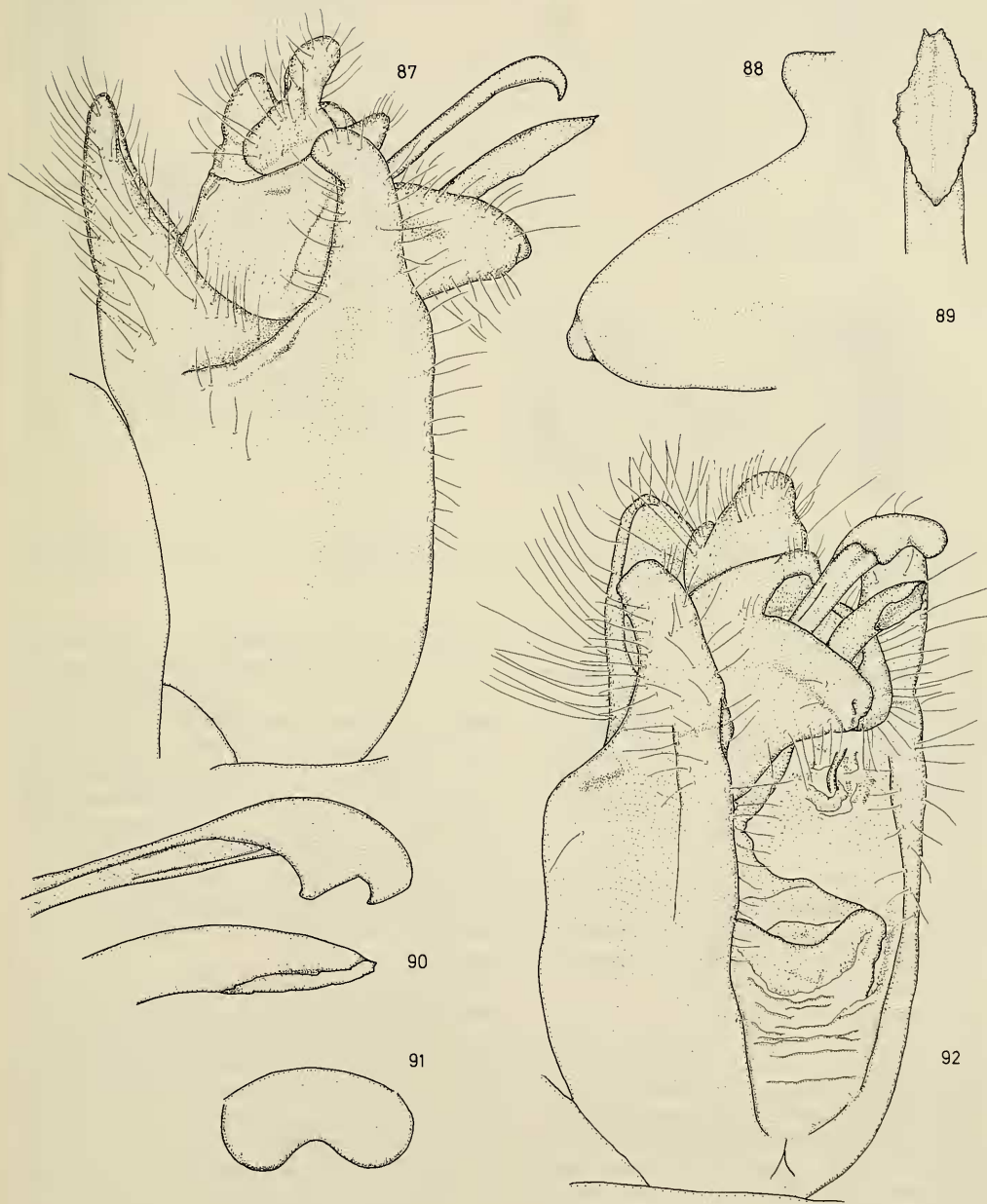
Head. — Antennae dark coloured, especially from segment 2 to apex. Combs weakly developed on segment 3, hardly present on segment 4. Eye $0.59 \times$ as wide as width of vertex between eyes. Area between raised ocelli and on

supra-antennal plates slightly darker coloured than rest of head; distance between lateral ocelli $0.93\text{--}1.14 \times$ distance between lateral ocellus and eye. Head $1.52\text{--}1.68 \times$ as long as, $2.18 \times$ as wide as width of vertex between eyes. Postclypeus very narrow in lateral view, its upper portion slightly darker coloured in lateral view. Rostrum with dark apex reaching coxae of middle legs.

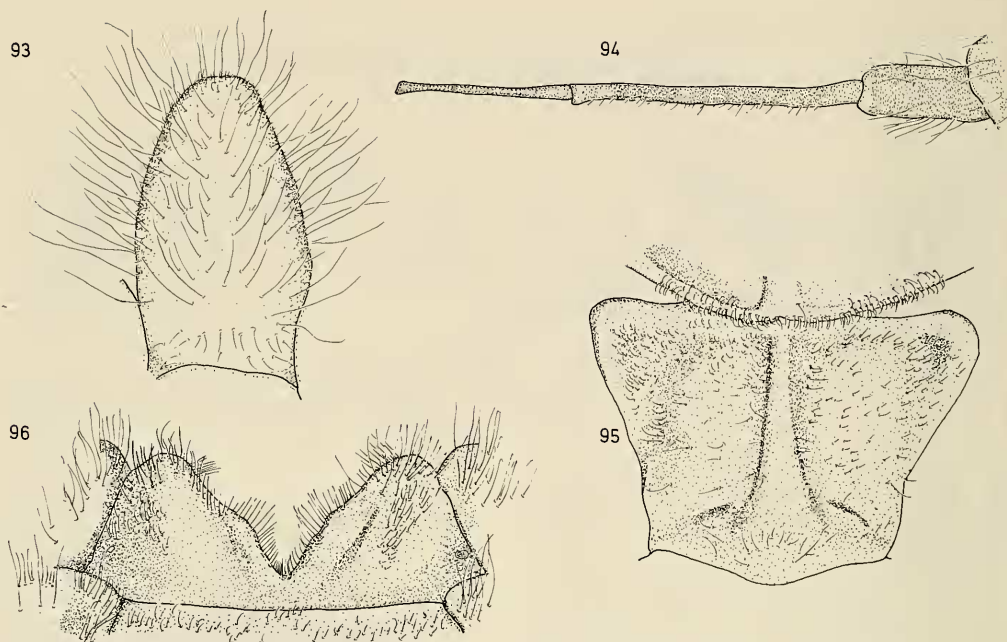
Thorax. — Pronotum collar greenish tinged with a medially placed pale-brown spot, widely amplified at lateral corners; $1.69\text{--}1.81 \times$ as wide as width of head including eyes, $2.34\text{--}2.41 \times$ as wide as length of head. Ochraceous-brown pronotum slightly domed. Mesonotum of the male with a light ochraceous-brown area in front of cruciform elevation, two small dark-brown paramedian, obconical areas and dark-brown lateral sides. Mesonotum of female on the whole fairly dark. Cruciform elevation and metanotum medially brown.

Legs. — Concolorous with underside of body except for fore tibiae and intermediate coxae. Darkening towards claws. Fore tibiae with a large apical spot and a slightly smaller one at $\frac{1}{3}$ from their bases. Armature of fore femora consisting of a basal, slightly pointed, relatively thick and round thorn, and two more apically situated pointed spines; most apical one the smallest. All thorns dark-coloured.

Tegmina and wings. — Hyaline tegmina with yellowish-greenish veins; costa with its basal half brownish coloured, slightly depressed beyond base. Extreme base whitish-pink, basal area infuscated. Transverse vein of 2nd ulnar area extending well into 3rd ulnar area; continued by a distinct corial fold. Dark-red to brown spots in cells of tegmen. Heavily pigmented



Figs. 87—92. *Lembeja mirandae*, holotype. 87, pygofer, lateral view; 88, clasper, lateral view; 89, apex of aedeagus, ventral view; 90, aedeagus with appendage, ventrolateral view; 91, apex of aedeagal appendage, ventral view; 92, pygofer, ventrolateral view.



Figs. 93—96. *Lembeja mirandae*; 93—95, holotype; 96, paratype. 93, sternite 8, ventral view; 94, left antenna segm. 1—4, lateral view; 95, tergite 1, dorsal view; 96, sternite 7, ventral view.

with brown in apical half of 4th ulnar area along corial fold. Large brownish red spots at tegmen border medially placed at apices of apical areas. Node halfway M_{3+4} distinct. Third ulnar area $0.93 \times$ as long as 1st one; 4th ulnar area $0.94—0.98 \times$ as long as radial area. Wings hyaline with red veins, extreme base whitish-pink. Fusion of Cu_2 and A_1 at 91% of their length.

Male: Operculum. — Dark coloured, large (compared to opercula of other members of the same subgroup), just reaching over tymbal cavity. Pale-ochraceous meracanthus reaching well over tymbal cavity.

Abdomen. — Greenish brown, ventrally as well as laterally paler coloured. Tergite 1 darker than other tergites, its proximal edge thickened, somewhat lighter coloured, rounded at the sclerotized flaps. Triangular bulb depressed, leveling it distally with the slightly depressed lateral parts of the tergite. Sternites with small, medial light-brown spots. Sternite 8 large, apically straight to rounded.

Tymbals. — Nineteen long and an equal number of short orange-brown ridges.

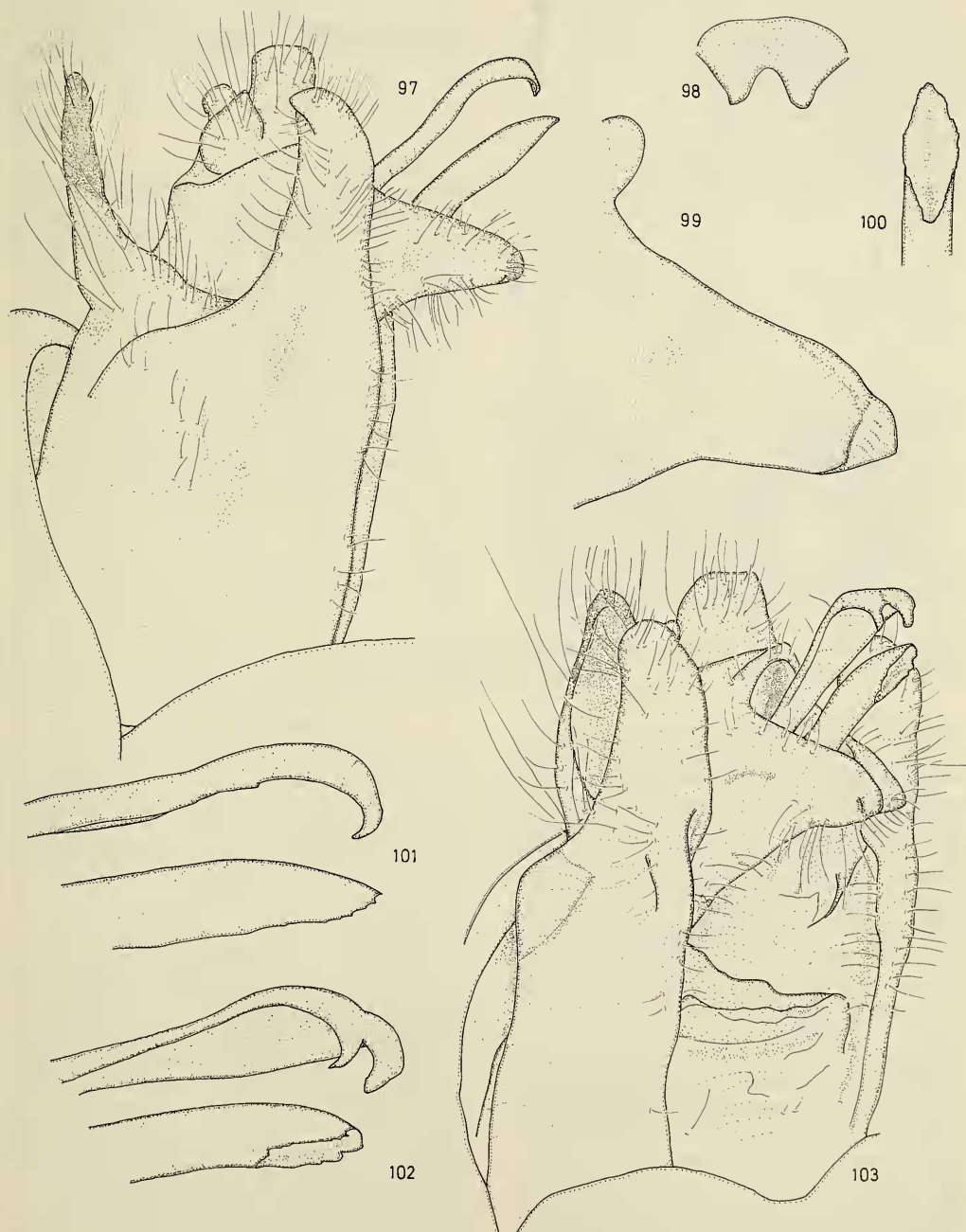
Genitalia. — Caudal dorsal beak not extending beyond anal valves, apically rounded.

Lateral pygofer lobes fairly short. Edge running downwards from each lateral lobe to base of pygofer apically slightly produced. Claspers in lateral view broad. Nail-shaped protrusion only small. Median uncus part with a broad protrusion. Aedeagus with broad apex, dorsally only very slightly produced. Sclerotized aedeagal appendage stout, apically rounded, reasonably incised; reaching apex of aedeagus. Adjustment of aedeagus relatively high in ventral view.

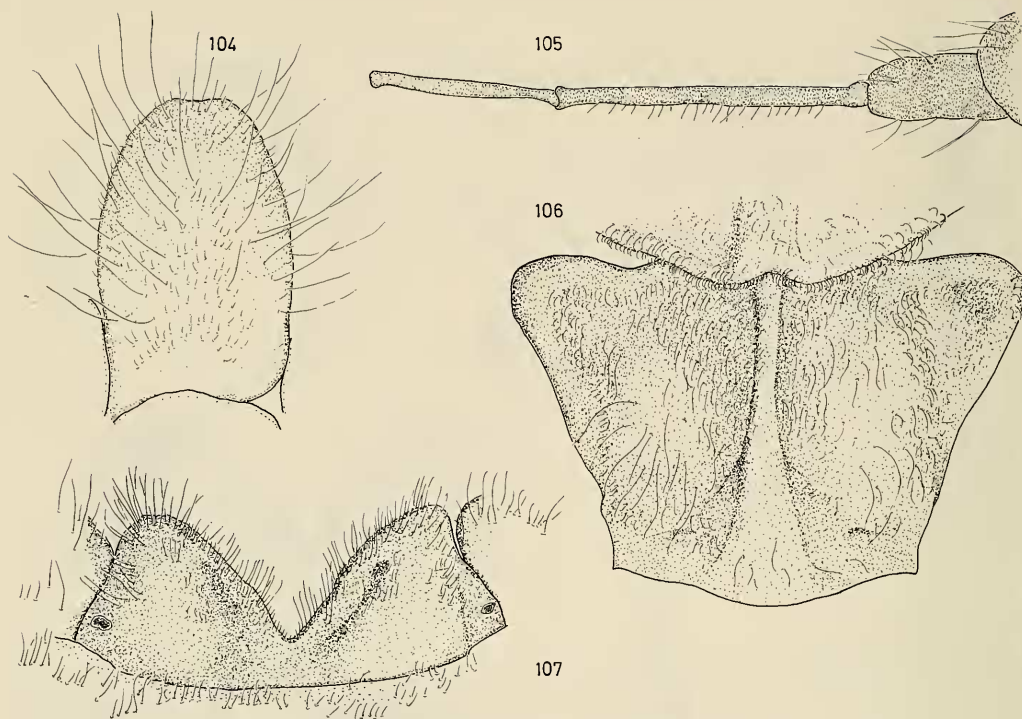
Female: Operculum. — Small, dark coloured. Meracanthus apically dark and reaching over sternite 3.

Abdomen. — Light-ochraceous with two lateral, broad dark-coloured fasciae, running from segment 3 to segment 8, and a more narrow, medial dorsal light-coloured fascia running up to pale-ochraceous caudal dorsal beak. Distal edges of tergites light coloured. Sternites 3—6 with median, slightly darker triangular spots. Ovipositor sheath somewhat darker coloured than pale-ochraceous segment 9; its apex, being $0.39 \times$ as long as abdomen, even darker.

Measurements of the types: body length δ : 22.8 mm, η : 20.4 mm; width of pronotum collar δ : 7.6 mm, η : 7.2 mm; tegmen length δ : 25 mm, η : 24.6 mm.



Figs. 97—103. *Lembeja majuscula*, holotype. 97, pygofer, lateral view; 98, apex of aedeagal appendage, ventral view; 99, clasper, lateral view; 100, apex of aedeagus, ventral view; 101, 102, aedeagus with appendage, 101, lateral view, 102, ventrolateral view; 103, pygofer, ventrolateral view.



Figs. 104—107. *Lembeja majuscula*; 104—106, holotype; 107, ♀, paratype. 104, sternite 8, ventral view; 105, left antenna segm. 1—4, lateral view; 106, tergite 1, dorsal view; 107, sternite 7, ventral view.

Distribution. — Central Sulawesi (map 2).

Types. — Indonesia, Sulawesi: Holotype: "Stat. 41/Lower montane/forest/MV light" (print), "Rano Rano, 1600 m/10 km NE Gimpu/14.iii.1985/J. P. & M. J. Duffels" (print), "Indonesia/Sulawesi Tengah/Lore Lindu N.P." (print), 1 ♂ (ZMA). Paratype: same data as holotype but: st. 43, 15.iii.1985, 1 ♀ (ZMA).

Etymology. — This beautifully pigmented species is dedicated to a very special friend with the most appropriate name Miranda, which, in Latin, stands for "to be admired".

Remarks.

L. mirandae, *L. majuscula* n.sp. and *L. incisa* n.sp. are the only three species described within the *foliata* subgroup that are more or less heavily pigmented, as well considering their body as their tegmina. To a certain extent these three species remind of the *L. distanti* subgroup in some features, viz. tergite 1 depressed distally on both sides of the medial ridge, and as for *L. mirandae* and *L. majuscula* n.sp., the weakly developed antennal combs and the heavily pigmented tegmina.

Lembeja majuscula n.sp. (figs. 97—107, 143, 144, map 2)

This largest and most heavily pigmented species of the *foliata* group is described in comparison with *L. mirandae* after two males and one female from the Lore-Lindu N.P. in Central Sulawesi.

Description.

A large hairy species with brown to ochraceous ground-colour, which is tinged with green, and some dark patches on the thorax. Ventrally slightly paler than dorsally. Pigmentation of cells of tegmina very conspicuous. Head and pronotum together $1.02\text{--}1.09\times$ as long as meso- and metanotum together. Head and thorax together in males $0.70\text{--}0.71\times$, in the female $0.86\times$ as long as abdomen. Greatest width of body at the height of abdominal segment 3.

Head. — Dark or light-ochraceous to brownish green. Eye $0.53\text{--}0.54\times$ as wide as width of vertex between eyes. More or less darker coloured between raised ocelli and on edge of supra-antennal plate; distance between lateral ocelli $0.84\text{--}1.15\times$ distance between lateral

ocellus and eye. Antennae dark coloured, especially from segment 2 to apex. Combs only very slightly developed on segment 3. Head $1.52\text{--}1.61 \times$ as long as, $2.06\text{--}2.07 \times$ as wide as width of vertex between eyes. Upper portion of postclypeus in lateral view somewhat darker coloured, female with ventrally a median dark stripe.

Thorax. — Pronotum irregularly patched with darker spots. Pronotum collar tinged with green, $1.78\text{--}1.91 \times$ as wide as width of head, $2.37\text{--}2.60 \times$ as wide as length of head. Obconical areas on mesonotum hardly discernable, paramedian ones indicated by a narrow light-coloured margin. Greatest part of cruciform elevation light-coloured, with a median dark-brown line, continued on the metanotum.

Legs. — As in *L. mirandae*, but slightly darker.

Tegmina and wings. — General shape and coloration as in *L. mirandae*, but tegmina, especially in the female, with distinctly heavier pigmentation in cells of the tegmina and along veins than in *L. mirandae*. Heavily pigmented in apical half of 4th ulnar area near corial fold, and in 8th apical area. Extreme base whitish-pink. Third ulnar area $0.91\text{--}1.01 \times$ as long as 1st one; 4th ulnar area $1.01\text{--}1.11 \times$ as long as radial one. Wings as in *L. mirandae*, extreme base more whitish coloured. Fusion of Cu_2 and A_1 at $73\text{--}85\%$ from their origin.

Male: Operculum. — Dark coloured, relatively large. Meracanthus reaching well over tymbal cavity.

Abdomen. — Broadly shaped, greenish coloured; sternites with medial light-brown spots, less conspicuous than in *L. mirandae*. Tergite 1 as in *L. mirandae*. Mediodorsally dark-coloured along the carination of segment 3—8. Tergite 1 as in *L. mirandae*. Sternite 8 relatively broad; apex rounded and dark.

Tymbals. — Provided with 20 long, medially dark-coloured ridges alternating with 19 short, orange-brown coloured ones.

Genitalia. — Caudal dorsal beak dark-coloured and apically pointed. Lateral lobes broad, slightly darkening to their apices. Edge running downwards from lateral lobe to base of pygofer slightly produced just under lateral lobe. Claspers narrow, long and dark in lateral view. Nail-shaped protrusion of clasper small. Median uncus part slightly produced. Sclerotized aedeagal appendage stout, apically fairly deeply incised, creating two very short pointed processes, reaching apex of aedeagus. Aedeagus relatively

less broad than in *L. mirandae*.

Female: Operculum. — Small, dark coloured. Meracanthus reaching over sternite 3.

Abdomen. — Ochraceous with three broad, dark-coloured fasciae, the upper edges of the lateral ones almost touching the edges of the dorsal one; dorsal one very dark on segment 9, including caudal dorsal beak, lateral ones not reaching hind margin of segment 8. Hind margins of tergites lighter coloured. Ovipositor sheath dark, especially at apex; $0.36 \times$ as long as abdomen.

Measurements of the types: body length δ : $24.3\text{--}25.5$ mm, η : 2.16 ; width of pronotum collar δ : $8.3\text{--}8.4$ mm, η : 7.9 mm; tegmen length δ : $27\text{--}27.7$ mm, η : 26.1 mm.

Distribution. — Central Sulawesi (map 2).

Types. — Indonesia, Sulawesi: Holotype: "Stat. 55/Disturbed lower/montane forest/ML-light, canopy" (print), "10 km SE Poloka/1900m, 25.iii.1985/J. P. & M. J. Duffels" (print), "Indonesia/Sulawesi Tengah/Lore Lindu N.P." (print), 1 δ (ZMA). Paratypes: same data as holotype, 1 δ (MZB) 1 η (ZMA).

Etymology. — The name of this heavily pigmented species, "*majuscula*", refers to its larger size compared to the other, slightly less heavy pigmented species within the *foliata* subgroup, *L. mirandae*.

Remarks.

L. majuscula, *L. mirandae* and *L. incisa* n.sp. seem to form a separate taxonomic unit within the *foliata* subgroup, because of the pigmentation, the size of the male opercula, the shape of the male tergite 1 and some features in the male genitalia. *L. majuscula* differs, apart from its size, from *L. mirandae* in the darker coloured body and the more conspicuous pigmentation of the cells of the tegmina.

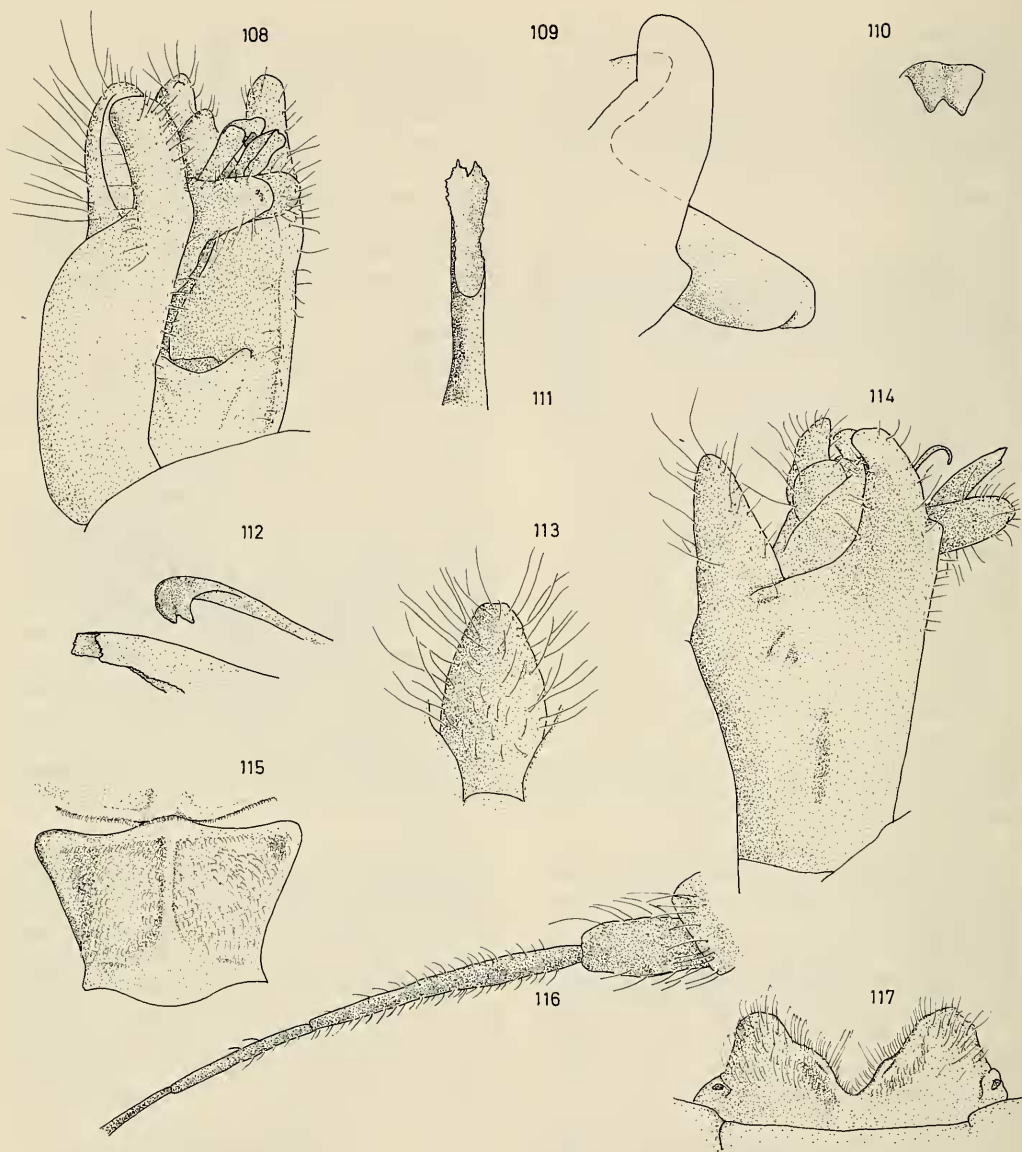
Lembeja incisa n.sp.

(fig. 108—117, map 2)

This small, pigmented species is described in comparison with *L. mirandae* after two males and five females from the Lore-Lindu N.P. in Central Sulawesi.

Description.

Small, pigmented species, coloured with olivaceous-green, brown to dark-brown. Ventrally pale-ochraceous. Apical cells of tegmina shaded, hardly consisting of dark-brown spots. Head and pronotum together $1.09\text{--}1.31 \times$ as long as meso- and metanotum together. Head and tho-



Figs. 108—117. *Lembeja incisa*; 108—110, 112, 114, 115, holotype, 111, 113, ♂, paratype; 116, 117, ♀, paratype. 108, pygofer, ventrolateral view; 109, clasper, lateral view; 110, apex of aedeagal appendage, ventral view; 111, apex of aedeagus, ventral view; 112, aedeagus with appendage, ventrolateral view; 113, sternite 8, ventral view; 114, pygofer, lateral view; 115, tergite 1, dorsal view; 116, left antenna segm. 2—4, lateral view; 117, sternite 7, ventral view.

rax in males $0.77\text{--}0.85 \times$, in females $0.89\text{--}1.12 \times$ as long as abdomen. Greatest width of body at the height of abdominal segment 3.

Head. — Antennae dark coloured. Combs less weakly developed than in *L. mirandae*, present on both antennal segment 3 and 4. Eyes $0.52\text{--}0.58 \times$ as wide as width of vertex in be-

tween eyes. Ground colour of head olivaceous; dark-brown between lateral ocelli, paler brown on supra-antennal plates and sometimes on postclypeus. Distance between lateral ocelli $1.0\text{--}1.15 \times$ distance between lateral ocellus and eye. Head $1.41\text{--}1.68 \times$ as long, $2.03\text{--}2.16 \times$ as wide as width of vertex in between eyes. In

lateral view upper portion of postclypeus darker coloured than basal portion. Rostrum as in *L. mirandae*.

Thorax. — Pronotum on the whole fairly olivaceous-greenish tinged, with irregularly brown pronotum collar, fissures and central fascia. Pronotum collar $1.54\text{--}1.69 \times$ as wide as width of head, $2.09\text{--}2.45 \times$ as wide as length of head. Olivaceous-green mesonotum usually covered with brown patches, as in *L. mirandae* and *L. majuscula*. Cruciform elevation and metanotum medially brown, its distal edge more covered with brown than in *L. mirandae* and *L. majuscula*. Ventrally paler, though dark patches sometimes present.

Legs. — As in *L. mirandae*, but dark coloured patches more conspicuous.

Tegmina and wings. — Tegmina generally as in *L. mirandae*, but less spotted within the tegmen cells, especially apical areas 1—7. Third ulnar area $0.76\text{--}0.98 \times$ as long as 1st one; 4th ulnar area $0.89\text{--}1.02 \times$ as long as radial area. Wings as in *L. mirandae*, fusion of Cu_2 and A_1 at 80—89% of their length.

Male: Operculum. — Slightly darker than body ventrally. Small, hardly reaching over tymbal cavity. Meracanthus pale-ochraceous, reaching just over tymbal cavity.

Abdomen. — Olivaceous-green. Tergite 1 almost completely dark coloured, shape as in *L. mirandae*. Medio-dorsally dark coloured along tergites 2—8. Two lateral broad, dark coloured fasciae, running from segment 3—7. Sternites pale olivaceous-green. Sternite 8 small, apically more pointed than in *L. mirandae*.

Tymbals. — Eighteen long and an equal number of short orange-brown ridges.

Genitalia. — Caudal dorsal beak just not extending beyond anal valves, apically rounded. Lateral pygofer lobes fairly long, slightly diverging in ventral view. Edge running downwards from each lateral lobe to base of pygofer apically produced. The flat enlargement very narrow. Claspers in lateral view narrow, as in *L. pectinulata*. Nail-shaped protrusion small. Median uncus part reasonably pointed. Broad apex of aedeagus with a slight dorsal incision. Weakly sclerotized aedeagal appendage not reaching apex of aedeagus; shape as in *L. majuscula*. Adjutment of aedeagus as in *L. mirandae*.

♀: **Operculum.** — Small, slightly dark coloured. Pale ochraceous meracanthus reaching just over sternite 3.

Abdomen. — Ochraceous. The two lateral fasciae running from segment 3—7 and the dor-

sal fascia running from segment 1 up to the caudal dorsal beak as in *L. mirandae*, though more prominent. Distal edges of tergites 1—7 concolorous with the dorsal fascia. Sternites pale ochraceous. Ovipositor sheath $0.33\text{--}0.36 \times$ as long as abdomen, somewhat darker coloured than pale ochraceous segment 9.

Measurements of the types: body length ♂: $14.2\text{--}15$ mm, ♀: $15.1\text{--}16.7$ mm, $\bar{x} = 16.0 \pm 0.7$ mm; width of pronotum collar ♂: 4.7 mm, ♀: $5.5\text{--}5.8$ mm, $\bar{x} = 5.7 \pm 0.1$ mm; tegmen length ♂: $17.2\text{--}17.8$ mm, ♀: $18.7\text{--}20.9$ mm, $\bar{x} = 19.8 \pm 0.8$ mm.

Distribution. — Central Sulawesi (map 2).

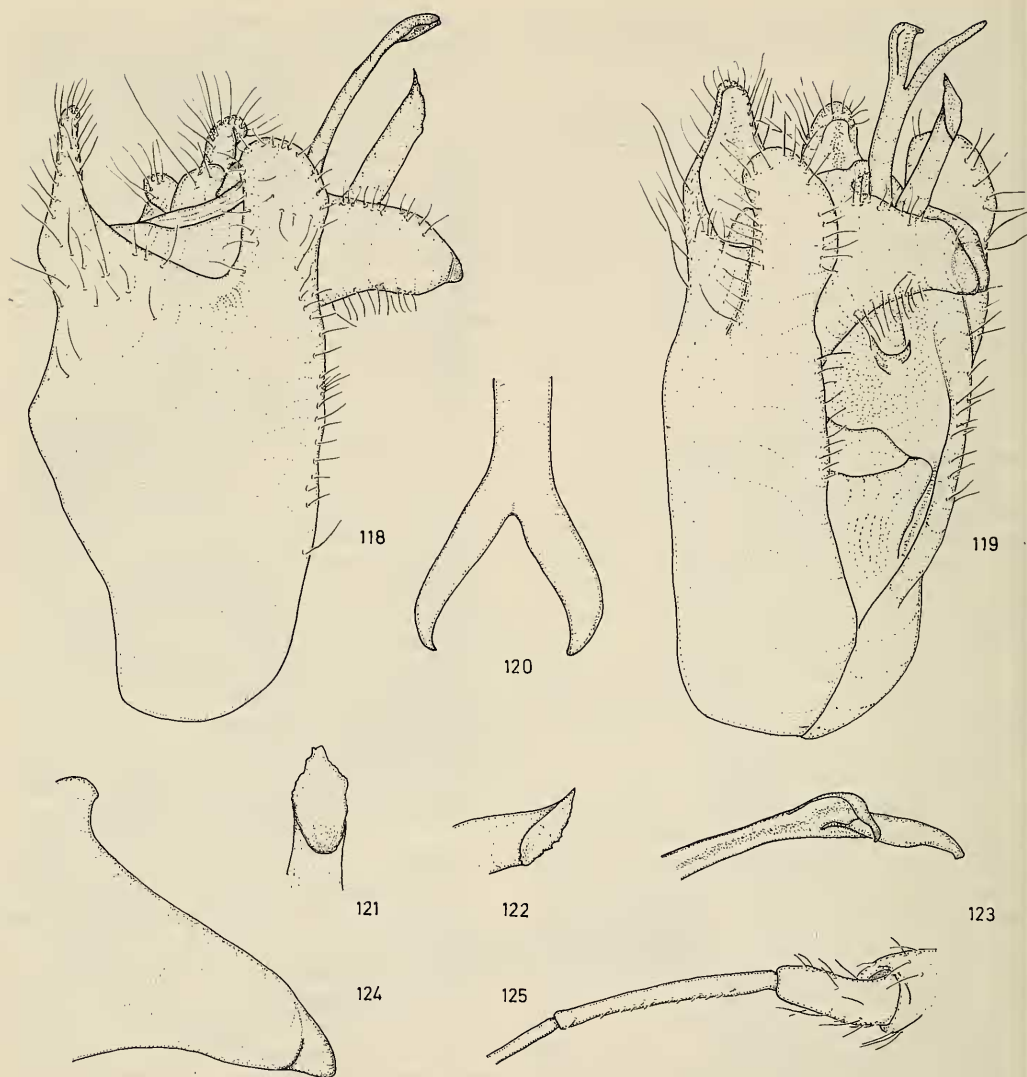
Types. — Indonesia, Sulawesi: Holotype: "Museum Leiden Sulawesi/Palu, 65 km SSE of Lore/Lindu NP, Marena shelter./UTM SJ62; 13 Dec. 1985 A/Van Tol & Kriken" (partly print, partly handwritten), 1 ♂ (RMNH). Paratypes: Sulawesi Tengah, Lore Lindu N.P.: same data as holotype but: 13.xii.1985, 1 ♀ (RMNH), 14.xii.1985, 1 ♂ (RMNH), same data but: 16.xii.1985, 1 ♀ (ZMA), same data but: 17.xii.1985, 1 ♀ (RMNH), same data but 13—17.xii.1985, 1 ♀ (RMNH); Marena, Hihia, 400 m, 10 km N Gimpu, ML-light, 20.iii.1985, J. P. & M. J. Duffels, 1 ♀ (ZMA).

Etymology. — The species is named *incisa*, because it is the only species within the *foliata* group with an incised apex of the aedeagus.

Remarks.

Though pigmented alike *L. mirandae* and *L. majuscula*, *L. incisa* has some features that remind of other species. The weakly sclerotized aedeagal appendage is reminiscent of that of *L. foliata* and related species, whilst the claspers are alike the ones of *L. pectinulata*. Finally, the flat enlargement in the male genitalia is hardly developed, suggesting being more similar to the species of the *distanti* subgroup, that have no enlargement at all.

This small species is recorded from an altitude between 400—600 m. The larger *L. mirandae* is recorded from 1600 m, and the largest pigmented species, *L. majuscula*, is from 1900 m. This feature, that within a small assemblage of, probably, closely related species, the body size increases when taken at an higher altitude, is also displayed when comparing *L. minahassae*, *L. elongata* and *L. dekkeri*, and for *L. hollowayi* and *L. oligorhanta*. Whether this feature is also displayed in other species-groups of the Prasiini, or even in other Cicadoidea, is under study.

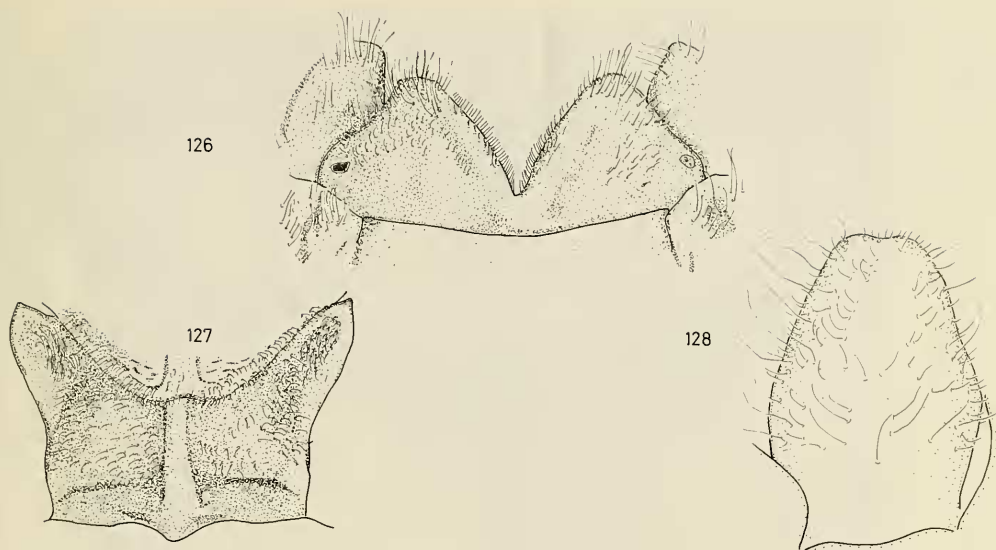


Figs. 118—125. *Lembeja distanti*, holotype. 118, 119, pygofer, 118, lateral view, 119, ventrolateral view; 120, apex of aedeagal appendage, dorsal view; 121, 122, apex of aedeagus, 121, ventral view, 122, ventrolateral view; 123, apex of aedeagal appendage, ventrolateral view; 124, clasper, lateral view; 125, left antenna segm. 1—4, lateral view.

The *distanti* subgroup

Within the *foliata* group as a whole, the *distanti* subgroup can be recognized by the almost complete lacking of the antennal combs. Furthermore, eyes medium-sized, $0.56\text{--}0.75 \times$ width of vertex between eyes. Fore femora with 2nd spine from base (homologous to middle thorn in other Prasiini) relatively large. Male

tergite 1 depressed distally at both sides of triangular-shaped bulb. Opaque tegmina pigmented with minute punctations in cells of the tegmina. Spots along veins brown. Sclerotized aedeagal appendage with hook-shaped apex. Lateral lobe bulbous. Ovipositor sheath extending not far beyond caudal dorsal beak.



Figs. 126—128. *Lembeja distanti*; 126, ♀, paratype; 127, 128, holotype. 126, sternite 7, ventral view; 127, tergite 1, dorsal view; 128, sternite 8, ventral view.

***Lembeja distanti* n.sp.**
(figs. 118—128, map 1)

The species is described after three males and two females.

Description.

Dull brownish testaceous to sometimes reddish in females. Ventrally paler. Head and pronotum together $0.95\text{--}1.04 \times$ as long as meso- and metanotum together. Head and thorax together in males $0.88 \times$, in females $1.07 \times$ as long as abdomen. Greatest width of body at the height of abdominal segment 3.

Head. — Antennal comb on segment 3 sometimes only scarcely discernable. Eye large, in dorsal view $0.62\text{--}0.65 \times$ as wide as width of vertex between eyes. Ocelli raised. Distance between lateral ocelli $0.82\text{--}0.97 \times$ distance between lateral ocellus and eye. Head $1.41\text{--}1.72 \times$ as long, $2.24\text{--}2.42 \times$ as wide as width of vertex between eyes. Upper portion of postclypeus in lateral view slightly darker coloured. Rostrum with dark apex reaching trochanter of middle leg.

Thorax. — Pronotum with some dark-brown patches. Pronotum collar $1.60\text{--}1.74 \times$ as wide as width of head, $2.26\text{--}2.73 \times$ as wide as length of head. Central fascia slightly reddish. Mesonotum mottled within 4 obconical areas.

Legs. — Concolorous with ventral side of thorax. Fore and middle tibiae darkening towards claws, and with somewhat darker spots at their bases and apices. Fore femora with 4—5 spines: a basal long, rounded and apically pointed one, the following, pointed one (the so-called middle thorn in other Prasiini) very sturdy, which is followed by 2—3 gradually smaller, pointed thorns.

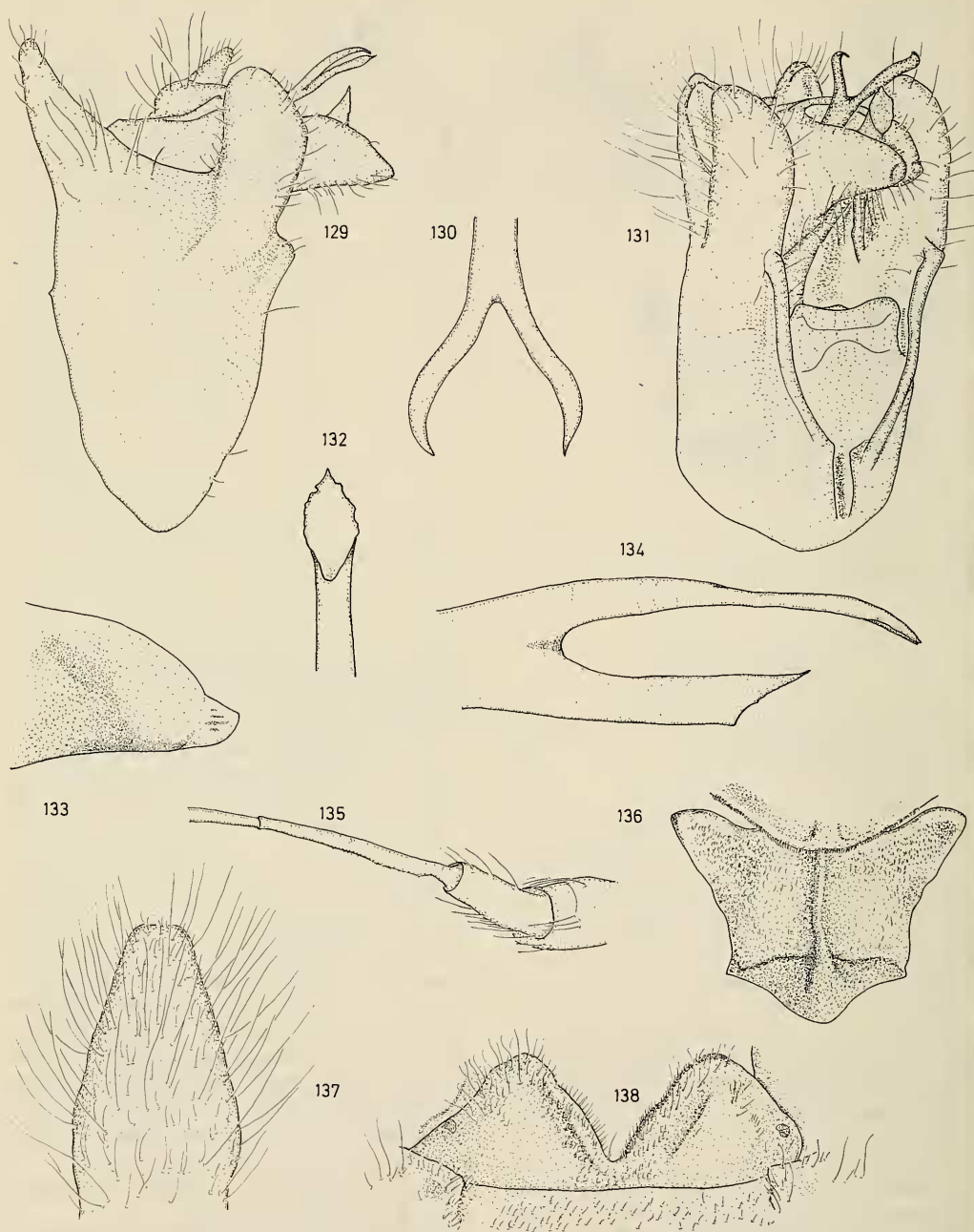
Tegmina and wings. — Tegmina subhyaline with a high number of small red punctations, combined irregularly to smaller and larger patches within the cells of the tegmina, and to more regular patches along the veins. Transverse vein of 2nd ulnar area extending just into the 3rd one; continued by a fold. Node halfway M_{3+4} distinct. Extreme base whitish to pink. Third ulnar area $0.97\text{--}1.08 \times$ as long as 1st one; 4th ulnar area $1.08\text{--}1.25 \times$ as long as radial one. Wings with red to white veins. Fusion of Cu_2 and A_1 at 88—95% from their origin.

Male: Operculum. — Small, meracanthus reaching over tymbal cavity.

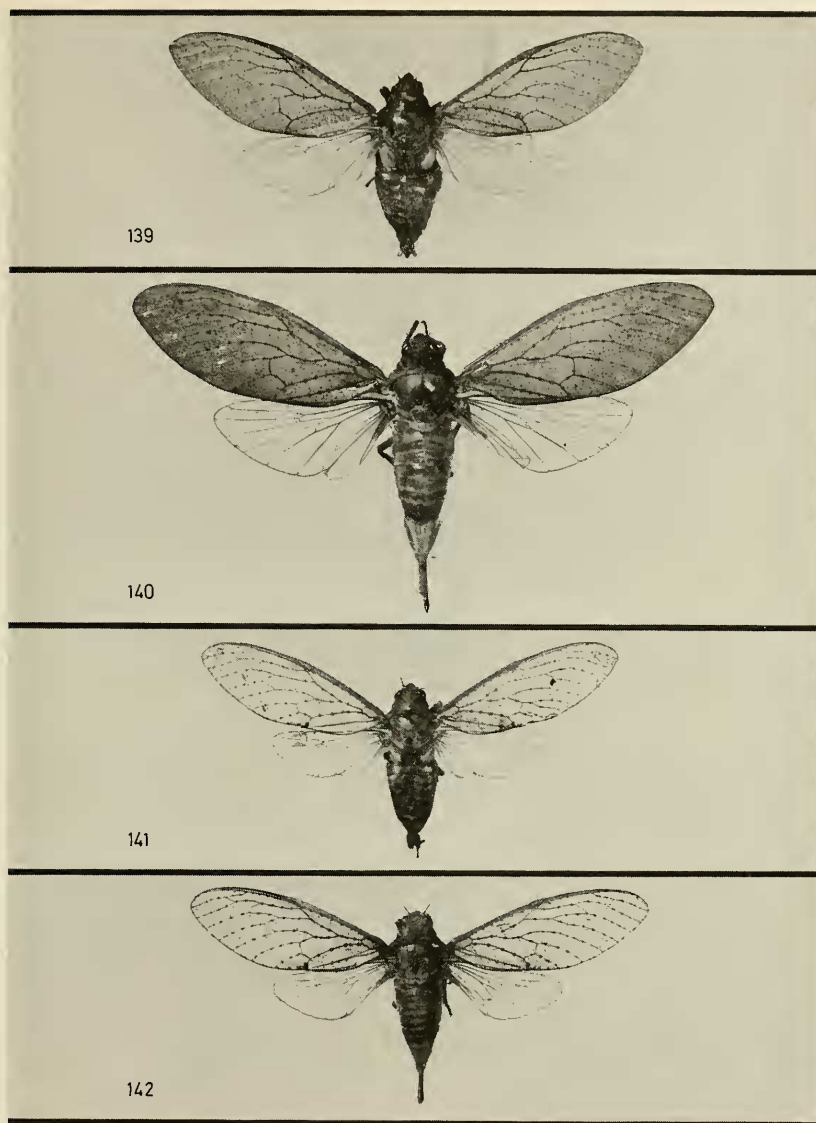
Abdomen. — Broad. Tergite 1 strongly depressed distally at both sides of triangular shaped bulb. Sternite 8 broad, posterior margin almost straight.

Tymbals. — Fourteen to 15 long ridges alternating with an equal number of short ridges.

Genitalia. — Apically pointed caudal dorsal



Figs. 129—138. *Lembeja brendelli*; 129—137, ♂, Ranu River Area; 138, ♀ paratype Ranu River Area. 129, pygofer, lateral view, paratype; 130, apex of aedeagal appendage, dorsal view, holotype; 131, pygofer, ventrolateral view, paratype; 132, apex of aedeagus, ventral view, holotype; 133, clasper, lateral view, paratype; 134, aedeagus with appendage, lateral view, holotype; 135, left antenna segm. 1—4, lateral view, paratype; 136, tergite 1, dorsal view, holotype; 137, sternite 8, ventral view, paratype; 138, sternite 7, ventral view.



Figs. 139—142. General facies. 139, *Lembeja minahassae* ♂, paratype Toraut; 140, *Lembeja minahassae* ♀, paratype Edwards Camp; 141, *Lembeja hollowayi* ♂, paratype Toraut; 142, *Lembeja hollowayi* ♀, paratype Toraut.

beak extending not or just beyond anal valves. Lateral lobes in lateral view apically slightly recurved. Edge running downwards from lateral lobe to base of pygofer straight. Claspers in lateral view straight, nail-shaped protrusion medium-sized. Aedeagus apically with a slightly upcurved tooth. Dorsal aedeagal appendage apically with more or less flattened hook-shaped processes. Adjustment of aedeagus situated halfway pygofer lobe. Base of pygofer medially incised.

Female: Operculum. — Small, meracanthus just reaching sternite 3.

Abdomen. — Dorsally carinated. Segment 9 dorsally somewhat darker coloured. Ovipositor sheath $0.33 \times$ as long as abdomen.

Measurements of the types: body length δ : 19.7 mm ($n = 1$), η : 18.4 mm ($n = 1$); width of pronotum collar δ : 5.8—6.7 mm, η : 6.6 mm; tegmen length δ : 24.4 mm ($n = 1$), η : 22.7—22.8 mm.

Distribution. — Central and South-East Sulawesi (map 1).

Types. — Indonesia, Sulawesi: Holotype: "Celebes/Posso See/II 95 Sarasin" (handwritten), "Celebes/Posso See/Sarasins" (yellow label, handwritten), "1910/6" (partly print, partly handwritten), "coll. JACOBI" (print), "Staatl. Museum für Tierkunde Dresden" (print), 1 δ (SMD). Paratypes: Indonesia, Sulawesi: Kandari (= Kendari?), iv.1874, O. Beccari, *Perissoneura maculosa*, 1 δ (MSNG); Posso See, ii.95, Sarasin, *Lembeja sanguinolenta* Jacobi det, coll. Breddin, 1 δ (DEI), same data but: *sanguinolenta*, η , coll. Breddin, 1 η (DEI). Specimen without precise indication of locality: Celebes, 1 η (SMD).

Etymology. — The species is named after W. L. Distant, one of the greatest contributors to the knowledge on the Cicadoidea, primarily concerned with the taxonomy of several insect groups, among which the superfamily Cicadoidea. Furthermore, he is the author of the genus accommodating the species described in this publication (Distant, 1883, 1892).

Remarks.

L. distanti and *L. brendelli* n.sp. are very similar in their male genitalia structures. Characters of distinction will be discussed in the remarks on *L. brendelli* n.sp.

Lembeja brendelli n.sp.

(figs. 129—138, 145, 146, map 1)

The species is described, in comparison with

L. distanti, after a fine series of male and female specimens collected by Mr M. J. D. Brendell (BM) during "Operation Drake" in Sulawesi Tengah in 1980.

Description.

Brownish ochraceous, sometimes reddish in females; pronotum and abdomen lighter coloured. Ventrally paler than dorsally. Head and pronotum together $0.93\text{--}1.19 \times$ as long as meso- and metanotum together. Head and thorax together in males $0.71\text{--}0.87 \times$, in females $0.77\text{--}1.09 \times$ as long as abdomen. Greatest width of body at the height of abdominal segment 3.

Head. — Mostly dark-coloured. Antennal comb may be hardly discernable by some hairs on the 3rd segment. Eye large, $0.56\text{--}0.75 \times$ as wide as width of vertex between eyes. Ocelli raised; distance between lateral ocelli $1.0\text{--}1.6 \times$ distance between lateral ocellus and eye. Head $1.33\text{--}1.76 \times$ as long, $2.12\text{--}2.49 \times$ as wide as width of vertex. Postclypeus in ventral view medially slightly to considerably darker. Rostrum with dark apex reaching trochanter of middle leg.

Thorax. — Pronotum with dark-coloured patches as in *L. distanti*. The central fascia on the pronotum usually dark-coloured and continues on pronotum collar. Lateral corners of pronotum collar mostly with dark patches. Pronotum collar $1.48\text{--}1.72 \times$ as wide as width of head, $2.08\text{--}2.81 \times$ as wide as length of head. Obconical areas on mesonotum sometimes lighter, sometimes darker than ground colour. Cruciform elevation with a medial longitudinal dark line, which continues on the metanotum.

Legs. — Generally as in *L. distanti*, though fore and middle legs on the whole darker tinged. Arrangement of the 4, dark-coloured spines on the fore femora as in *L. distanti*; most apical one very small.

Tegmina and wings. — Subhyaline, especially in females with a high number of small red punctations, that are combined to very large, almost tegmencell-filling, patches; also dark-red to brownish tinged small spots present, as well in the cells of the tegmina as along the veins. Extreme base pink to whitish. Transverse vein of 2nd ulnar area extending just to reasonably into the 3rd ulnar area, continued by a fold. Third ulnar area $0.76\text{--}1.01 \times$ as long as 1st one; 4th ulnar area $1.15\text{--}1.5 \times$ as long as radial area. Wings sometimes tinged basally with pink, extreme base pink to whitish. Fusion of Cu_2 and



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145



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Figs. 143—146. General facies. 143, *Lembeja majuscula* ♂, holotype; 144, *Lembeja majuscula* ♀, paratype; 145, *Lembeja brendelli* ♂, paratype; 146, *Lembeja brendelli* ♀, paratype Ranu River area.

A₁ at 85—98% from their origin.

Male: Operculum. — Small. Meracanthus reaching just over tymbal cavity.

Abdomen. — More slender than in *L. distanti*, triangular light-brown to ochraceous. Tergite 1 strongly depressed distally on both sides of the triangular shaped bulb; ridge sometimes slightly darker coloured. Sternite 8 broad, sometimes narrowing apically.

Tymbals. — Provided with 17—20 long ridges alternating with 16—20 short ridges.

Genitalia. — Generally as in *L. distanti*, but with the following differences: claspers less elongate; edge running downwards from each lateral lobe to base of pygofer with a distinct protrusion just under lateral lobe; lateral lobe more bulbous subapically; apex of aedeagus weakly upcurved; sclerotized processes aedeagal appendage round, slender and pointed.

Female: Operculum. — Relatively larger than in *L. distanti*. Meracanthus just reaching sternite 3.

Abdomen. — Reddish or brownish coloured with dark mark on segment 9. Ovipositor sheath $0.24\text{--}0.32 \times$ as long as abdomen.

Measurements of the types: body length ♂: $16.8\text{--}19.2$ mm, $\bar{x} = 17.6 \pm 0.8$ mm, ♀: $16.2\text{--}20.8$ mm, $\bar{x} = 18.5 \pm 1.3$ mm; width of pronotum collar ♂: $5.5\text{--}6.8$ mm, $\bar{x} = 6.0 \pm 0.4$ mm, ♀: $5.9\text{--}7.5$ mm, $\bar{x} = 6.9 \pm 0.9$ mm; tegmen length ♂: $19.4\text{--}20.2$ mm, $\bar{x} = 19.8 \pm 0.3$ mm, ♀: $20.4\text{--}24.6$ mm, $\bar{x} = 22.7 \pm 0.9$ mm.

Distribution. — Central Sulawesi (map 1).

Types. — Indonesia, Sulawesi: Holotype: "Sulawesi Tengah: Nt Morowali/Ranu River Area/27.i.—20.iv.1980" (print), "M. J. D. Brendell/B.M. 1980-280" (print), "Brit. Mus." (partly print, partly handwritten), 1 ♂ (BMNH). Paratypes: Indonesia, Sulawesi Tengah: same data as holotype, 4 ♂ 14 ♀ (BMNH), 3 ♂ 3 ♀ (ZMA), same data but: at light, lowl. rainf., 8 ♀ (BMNH), same data but: at MV light lowl. rainf., 3 ♀ (BMNH), same data but: lowl. rainf., 1 ♀ (BMNH); Solato R., Taronggo, $1^{\circ}45'S\text{--}121^{\circ}40'E$, 27—30.iii.1980, M. J. D. Brendell, BM 1980-280, 1 ♀ (BMNH).

Etymology. — The species is named after the British coleopterist Mr Martin J. D. Brendell (BMNH), who has collected the series of speci-

mens, upon which the description of this species is based.

Remarks.

L. brendelli can be separated from *L. distanti* by male genital characters, viz. the clearly out-curved edge running downwards from each lateral lobe to base of pygofer, the rounded, pointed processes of the dorsal aedeagal appendage and by the different number of long ridges on the tymbal. The very depressed distal parts of the male tergite 1 may be a synapomorphy for both species of the *distanti* subgroup.

REFERENCES

The list presented here is additional to the references of Part 1 of the study: "Taxonomy and biogeography of Oriental Prasiini" (De Jong, 1985).

- Boulard, M., 1975. *Iruana rougeoti* n.sp. intéressante cigale éthiopienne. — Bull. Soc. ent. Fr. 80: 176—179, figs. 1—2.
- Boulard, M., 1981. Recherches zoologiques en Ethiopie: Homoptera Cicadoidea. — Quad. Accad. Naz. Lincei, Roma 243: 57—60, figs. 1—8.
- Distant, W. L., 1897a. Cicadidae from the Malay Archipelago. — Ann. Mag. nat. Hist. (6) 20: 369—371.
- Distant, W. L., 1897b. Viaggio di Lamberto Loria nella Papuasie orientale xvii. Additions to our knowledge of the Cicadidae of New Guinea. — Annali Mus. civ. Stor. nat. Giacomo Doria (2) 17: 378—383.
- Jong, M. R. de, 1985. Taxonomy and biogeography of Oriental Prasiini 1: The genus *Prasia* Stål, 1863 (Homoptera, Tibicinidae). — Tijdschr. Ent. 128 (2): 165—191, figs. 1—91.
- Lallemand, V., 1935. Homoptères des Îles de la Sonde et de l'Australie du Nord. — Revue Suisse Zool. 42: 661—668, figs. 1—19.
- Lallemand, V. & H. Synave, 1953. Homoptères de Sumba et de Florès. In: Wissenschaftliche Ergebnisse der Sumba-Expedition des Museums für Völkerkunde und des Naturhistorischen Museums in Basel, 1949. — Verh. naturf. Ges. Basel 64: 903—912, figs. 1—2.

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